Vol. IV, No. 2 February, 1949

AGRICULTURAL CHEMICALS

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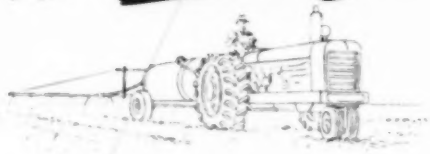
GROUP • PESTICIDE MARKET REPORT • FERTILIZER NEWS • TECHNICAL ABSTS • INDUSTRY PATENTS & TRADE MARKS

hard water is

Good enough for drinking

but not for spraying weeds!



Now Pittsburgh Iminol-D

stabilizes 2,4-D Amine Solutions and prevents hard water precipitates

The effective use of concentrated 2,4-D amine solutions for weed control has been made difficult, and sometimes impossible, in many agricultural regions because of *hard water* conditions. But *now* the precipitation of undesirable salts (caused by the dilution of concentrated 2,4-D amine solutions with "hard" water) can be avoided.

A new *Pittsburgh* chemical . . . IMINOL-D . . . when incorporated in 2,4-D concentrates at the time of formulation, not only prevents nozzle-clogging precipitates but also increases the wettability and effectiveness of the spray. Precipitation protection lasts for an adequate period after hard water dilution.

Since many of the richest agricultural areas in the country have water classified as hard or very hard, the introduction of Pittsburgh IMINOL-D is a development of significant importance to herbicidal spray manufacturers.

Full technical information is available in bulletin form. Write for *Pittsburgh* IMINOL-D Bulletin today!

Other "Pittsburgh" Agricultural Products

2,4-D Acid—Amines—Esters

Sodium Thiocyanate

BHC (Benzene Hexachloride)
Technical and Formulation Concentrates

DDT (Dichloro Diphenyl Trichloro Ethane)
Technical and Formulation Concentrates

DNOC (Dinitro Ortho Cresol)

ANTU (Alpha Naphthyl Thiourea)

Chlordane Concentrates

HETP TEPP PARATHION
(Organic Phosphate Insecticides)

Paradichlorobenzene

Orthodichlorobenzene

Phenol Disinfectants

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Empire State Building • 350 Fifth Avenue • New York 1, New York

Affiliated with

PITTSBURGH COKE & CHEMICAL COMPANY
Grant Building • Pittsburgh 19, Pa.

. . . the perfect answer to

easier dust formulation

A carrier and diluent for insecticide dusts and powders must do not one, but many jobs. Otherwise, it isn't the best for your needs.

Attaclay, our carrier and diluent, is highly adsorptive—accepts highest percentages of liquid or low-melting-point solid toxicants.

As a powder, it flows freely and retains its free-flowing looseness after intimate mixing or superfine grinding with the toxicant.

It is compatible—physically, chemically, biologically. It fits right into the picture with various forms and kinds of pest-control chemicals.

It has a low bulk density (30 lbs./cu. ft.) that makes it go further per pound—cuts your cost-of-materials item.

It has a proven record of superiority—from formulation to kill.

For over-all improvement of dusts—for the easiest and most resultful compounding you've ever known—you'll find Attaclay a superior diluent. We'll be glad to send a generous sample and provide guidance if desired.

ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Philadelphia 5, Pa.

CHAMPION *Double-Action* *means* FASTER DUSTING

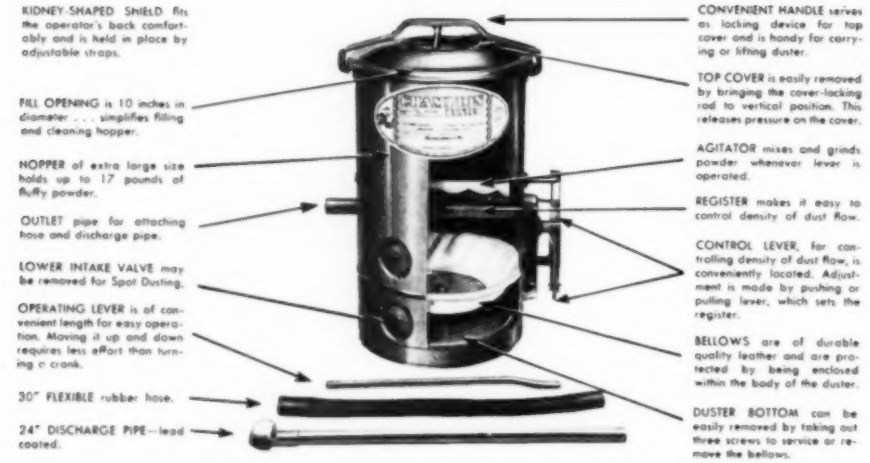
Saves Time • Labor • Powder

NOW you can get *more* and *better* dusting done in less time with the Champion Double-Action Duster. Its modern, advanced design means a *continuous* flow of powder whenever the lever is operated.

You dust, grind and mix powder with each up-stroke and with each down-stroke. With no interruption in the flow of powder, Champion's double action saves you time, labor and powder.

The Champion fits comfortably on the operator's back. Its easily operated bellows can throw a screen of dust exactly where wanted within a range of 30 feet. No heavy or bulky mechanisms are involved . . . no gears to get out of order and become hard to operate. Note the many features.

Only CHAMPION *Gives You These* CHAMPION *Features*


KIDNEY-SHAPED SHIELD fits the operator's back comfortably and is held in place by adjustable straps.
FILL OPENING is 10 inches in diameter . . . simplifies filling and cleaning hopper.
HOPPER of extra large size holds up to 17 pounds of fluffy powder.
OUTLET pipe for attaching hose and discharge pipe.
LOWER INTAKE VALVE may be removed for Spot Dusting.
OPERATING LEVER is of convenient length for easy operation. Moving it up and down requires less effort than turning a crank.
30" FLEXIBLE rubber hose.
24" DISCHARGE PIPE—lead coated.
CONVENIENT HANDLE serves as locking device for top cover and is handy for carrying or lifting duster.
TOP COVER is easily removed by bringing the cover-locking rod to vertical position. This releases pressure on the cover.
AGITATOR mixes and grinds powder whenever lever is operated.
REGISTER makes it easy to control density of dust flow.
CONTROL LEVER, for controlling density of dust flow, is conveniently located. Adjustment is made by pushing or pulling lever, which sets the register.
BELLOWS are of durable quality leather and are protected by being enclosed within the body of the duster.
DUSTER BOTTOM can be easily removed by taking out three screws to service or remove the bellows.

EASY to FILL • EASY to CLEAN

Big, 10-inch hopper cover makes the new Champion easy to fill and clean. Duster weighs 14 lbs. empty; holds up to 17 lbs. of fluffy powder.

Jobber and dealer territories open. Write for details.

CHAMPION SPRAYER CO. 6541A Heintz Ave. **DETROIT 11, MICH.**

Manufacturers of Portable Sprayers and Dusters

The Champion Line for '49

No. 1 Knapsack Sprayer

No. 102 Knapsack Spot Duster

No. 103 Hand Duster

No. 204 Slide Sprayer with Tank

No. 202 Utility Slide Sprayer

AGRICULTURAL CHEMICALS

THIS MONTH'S COVER

Successful application of 2,4-D and other herbicides for aquatic weed control has prompted the development of new kinds of equipment to do the job. Here a long extension boom reaches out over a small stream to apply herbicidal spray. (Photo courtesy of E. I. duPont de Nemours & Co., Inc., Wilmington)

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A Monthly Magazine For the Trade

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FOR YOUR INFORMATION

Larva of the European corn borer, *Pyrausta nubilalis* (Hbn.). Approximately 3 times actual size.

EXPANDED USE OF SANTOBANE NEEDED FOR MORE EFFECTIVE BORER CONTROL IN 1949

The coming season will see greater use of Santobane (Monsanto DDT) in the farmer's annual battle with the corn borer. Formulators of agricultural chemicals can do much toward winning the battle—by encouraging more intensive control with this powerful weapon. Halfway measures are not enough, since losses are growing year by year as the insect invades and becomes abundant in new areas... In 1947 the pest caused damage estimated at nearly $97,000,000—a figure undoubtedly exceeded in 1948.

Insecticidal treatment is not the whole answer to corn borer elimination... The farmer must also follow approved planting and plowing procedures — destroy infested growth as recommended by the U.S.D.A. and local agricultural authorities. Santobane will, however, provide excellent control of new infestation when applied at the right time in the right manner.

HERE'S HOW THE EUROPEAN CORN BORER IS SPREADING IN THE UNITED STATES

Areas known to be infested prior to 1947.

Areas reported as being infested for the first time in 1947.

Formulators and manufacturers of insecticides will find Santobane ideal for use in all agricultural applications involving DDT. Its uniform, free-flowing, granular characteristics allow it to be readily solubilized, emulsified or milled... For latest technical data, samples and prices, address Monsanto, Organic Chemicals Division.

HISTORY OF CORN BORER

ITS DISTRIBUTION IN NORTH AMERICA*

When the European corn borer was first reported and identified in North America in 1917, it was found to be causing severe damage to sweet corn in the vicinity of Boston, Mass., and to be present in a district comprising at least 100 square miles.

Subsequently it was learned that as early as 1917 the borer was also present in the vicinity of St. Thomas, Ontario, Canada, and in the districts centering around Schenectady and Silver Creek, N. Y.

The exact date on which this dangerous pest gained entrance to North America is not definitely known, but circumstantial evidence accumulated since its original discovery indicates strongly that broomcorn, imported from Hungary or Italy during the period from 1909 to 1914, was the probable means of entrance. The quarantine inspection service at ports of entry was not authorized by law until 1913, or subsequent to the probable original entry of the corn borer into this country.

The multiple-generation strain of the borer has been found over practically the entire infested area (shown on map), although its proportion to the single-generation strain varies in different localities, reaching its maximum in the southern infested counties and diminishing toward the north. Wherever the multiple strain is present the number of generations is established by the nature of the environment. A short season in the northern portions of the area is conducive to a single generation, while the long season on the eastern shore of Virginia allows the development of three generations annually. The insect has been found at several isolated points at some distance from the area of general infestation.

STRONG FLYERS

The corn borer moths are strong flyers, and it is believed that the extension of the infested area each year is caused principally by flight. Experiments have shown definitely that corn borer moths are able to fly for a distance of at least 20 miles, and judging from their general habits it is probable that they can and do fly greater distances. Large bodies of water do not check their flight, as the moths have been seen to alight on the surface of the water and again take flight. Experiments have also shown that the moths were able to reach cornfields surrounded by high hills or woodlands. During windy periods flight is usually with, or in the direction of, the wind.

CAN SURVIVE SUBMERSION

It is also known that, when hidden in cornstalks, the larvae can survive long periods of submersion in fresh or salt water. This fact, plus the fact the cornstalks are known to have been borne long distances in the currents of rivers, lakes, and the ocean, indicates that many of the new infestations along the North Atlantic seaboard, in the Great Lakes region, and along the river courses of the present infested area have had their origin in water-borne infested cornstalks or other infested plant material.

*From "The European Corn Borer," U. S. D. A. Farmer's Bulletin No. 1548.

RECENT U.S.D.A. PUBLICATION GIVES LATEST BORER DATA

Revised in September 1948, this booklet contains much valuable information on corn borer damage and control. Known as U. S. Department of Agriculture Farmer's Bulletin No. 1548, it is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 15c per copy.

(MORE ABOUT CORN)

2,4-D

WEED CONTROL INCREASES YIELD 11% TO 49%

"In 1947, about 45,000 acres of Kentucky, Iowa, Indiana and Pennsylvania corn that had grown up to weeds during a period of wet weather were saved from ruin by being treated with 2,4-D. An average of 60 bushels per acre was harvested. In Nebraska more than 50,000 acres were treated and estimated gains of 11 to 49% in production resulted."*

Results such as these show that proper application of Monsanto 2,4-D formulations will keep cornfields weed-free — increase yield by a profitable margin. Use of 2,4-D is especially recommended for wet lands in river and creek bottoms where most of the weeds are of broadleaf types—the kind most susceptible to 2,4-D.

ATTENTION, FORMULATORS

1949 weed control requirements now appear to be quite large. Herbicide formulators are therefore invited to contact Monsanto promptly regarding their needs for 2,4-D Acid, 2,4-D Sodium Salt and 2,4-D Isopropyl Ester—all manufactured to exacting standards of purity and uniformity. Ask also for latest literature and technical bulletins on weed control with Monsanto 2,4-D.

SUGGESTIONS FOR KEEPING CORNFIELDS WEED-FREE WITH MONSANTO 2,4-D*

"USE MINIMUM QUANTITY—When treating corn with 2,4-D it is recommended that no more than the minimum quantity per acre (½ to ¾ pound on the acid basis) be used. When the chemical is in "ester" form about 25 per cent less should be used than when it is in "amine" or "salt" form. Rate of application and type of equipment are essentially the same as for small grains.

"USE CAREFUL TIMING—While there is some difference of opinion as to the best time to apply 2,4-D, most authorities say it should not be applied before the corn is 8 inches high. Local conditions have an influence in this regard. The county agent should be consulted about both the quantity to be used and timing of the application."

(The pre-emergence treatment of cornfields with 2,4-D also shows great promise, but requires additional study before definite recommendations can be made.)

"USE CAUTION—Weed control by cultivation in corn on bottom lands often is extremely difficult because of wet fields. There are several million acres of such soils in the Mississippi, Missouri, and Ohio River valleys. *Weed specialists believe that use of 2,4-D in place of machine cultivators could bring an average increase of 10 bushels per acre in production of corn on these lands, year after year. But, they say, the job must be done carefully or crop losses instead of gains may result."*

*From "Weeding Small Grain and Corn," Fact Sheet No. OFFC-8, U. S. Department of Agriculture.

2,4-D CONTAINERS

Dispose of all 2,4-D containers in such a way that they cannot be re-used. Fibre, paper and wooden packages should be burned to eliminate the possibility of contaminating other products.

MUCH USEFUL INFORMATION IN U.S.D.A. FACT SHEET

Helpful hints for formulators and users of 2,4-D are contained in "Weeding Small Grain and Corn," Fact Sheet No. OFFC-8, available from the U. S. Department of Agriculture. We suggest that you write for a copy.

OTHER MONSANTO INSECTICIDAL CHEMICALS

NIFOS...NIFOS-T

GREENHOUSE ROSE GROWERS BOOST PRODUCTION

The protection from mites and aphids afforded by formulations of Nifos (Monsanto Hexaethyl Tetraphosphate) and Nifos-T (Monsanto Tetraethyl Pyrophosphate) is resulting in greatly increased rose production by greenhouse growers. Treatment with recommended aerosol formulations is simple, inexpensive and highly effective.

Nifos and Nifos-T are also useful for the control of destructive insect pests of farm, garden and orchard. Both products are quick-acting—do not present a residual toxicity problem.

Formulators of agricultural insecticides are invited to write for full details on these profitable applications of Nifos and Nifos-T. Address Monsanto, Organic Chemicals Division. *Sandohour, Nifos: Reg. U. S. Pat. Off.*

• • •

MONSANTO CHEMICAL COMPANY, Desk A, Organic Chemicals Division, 1766 South Second St., St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Akron, Cincinnati, Charlotte, Birmingham, Houston, Los Angeles, San Francisco, Seattle, Portland. In Canada: Monsanto (Canada) Limited, Montreal.

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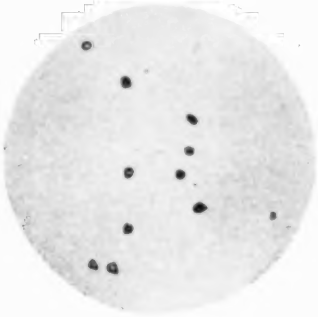
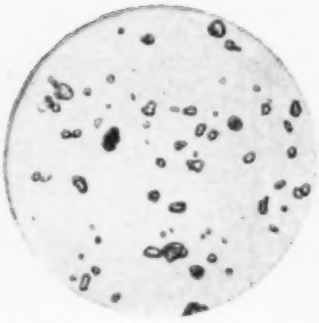


PENTECH A*



PENCO® DB-50 (DUST BASE) — A dust concentrate airmilled to micron size containing 50% DDT for use by compounders in preparing finished insecticide dusts.

PENCO WETTABLE POWDERS — WB-50 — For spraying agricultural crops—Airmilled to micron size for better suspension and coverage. Contains 50% DDT as active ingredient with superior spreaders and stickers incorporated.

CATTLE SPRAY — A 50% Wettable DDT powder designed exclusively for livestock pest control. Contains special selected wetting and depositing agents for livestock application.

Made especially for manufacturers of dust concentrates, dusts, and emulsion concentrates. PENTECH H is a granular, dry *friable* powder for use where high quality Technical DDT is required... by those who are interested in economy of operation.

but PENTECH

REVOLUTIONARY DDT OFFERS GREATER FLEXIBILITY TO MANUFACTURERS AND COMPOUNDERS

NOW... PENTECH* DDT

developed and produced exclusively by Pennsalt... proven in the field in 1948... is made available, through several forms, to the entire insecticide trade.

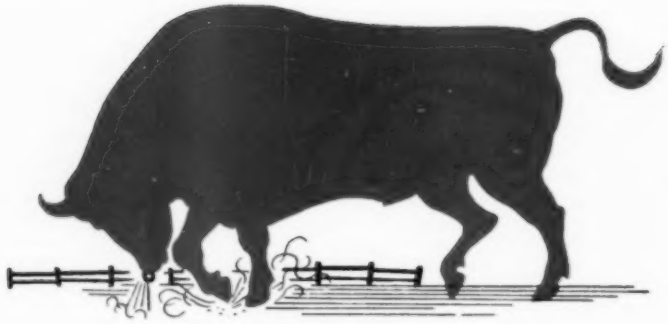
For those who produce finished DDT dust or spray compositions. PENTECH A is a unique DDT air-milled to micron size, designed primarily for users of *Concentrates* who are interested in economy and simplicity of handling.

PENTECH* now makes it possible for many interested in producing a finished dust or spray composition to do so without the use of 50% concentrates. Thus, through more economical active ingredient content, Pentech lowers freight, handling, and storage costs considerably.

Pennsalt's position as a basic producer of chemicals . . . assures you high quality products at a fair price. *Check for yourself. Write for Bulletin P-2, Agricultural Chemical Division,* ***Pennsylvania Salt Manufacturing Company,*** Philadelphia 7, Pa. • Bryan, Texas • Tacoma, Washington. *TRADE-MARK P.S.M. CO.

PENN SALT

agricultural chemicals



what's eating him?

Mites are. Grubs and flies, too. Each year these pests and ticks, keds, and fleas eat the farmer out of millions of dollars' worth of meat, eggs, wool, and leather. They live on the fat of the land. What licks them? Benzene hexachloride does.

CSC is producing technical-grade benzene hexachloride of a dry, flake type ideal for grinding. Available to manufacturers who formulate and produce insecticides.

CSC

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1. Quality . . . our Red Indian products are of unquestioned excellence.
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BUGTIME Stories
by ORBIS
Throughout the year, the members of the technical staff of the Orbis Products Corporation keep abreast of the latest developments in insecticides and their application. This information is then passed on to our customers to enable them to combat with promptness and efficiency when an infestation strikes. This is done by the medium of our latest series of advertisements known as "Bug Time Stories." They appear in Agricultural Chemicals and various other trade journals and magazines.
Look for these informative and enlightening "Bug Time Stories" throughout the ensuing year.

Orbis insecticides, which are for manufacturing use only, are sold under the trade name "Orbiscide." This trade name is your guarantee of uniformity, quality and performance. Among the long list of Orbiscides are cube powders, rotenone products, rotenone resins, pyrethrum powders and extracts and DDT products in many different forms. Write, wire or phone for samples, prices and further information on any Orbis insecticide.

Write for new catalog, Insecticides, Raw Materials & Uses.

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It will pay you to read this before you order spray pumps or other spray equipment.

Oberdorfer has an outstanding record among American manufacturers:

☛ Oberdorfer was established in 1876 and has manufactured millions of bronze gear pumps since the first one was turned out over 50 years ago.

☛ Production facilities here at Oberdorfer include a completely modern four-acre factory, built and equipped entirely with our money and not that of the U. S. Government.

☛ With a current financial rating of over $1,000,000, this company has the unrestricted capital so necessary to sound, *continuing* manufacturing, distribution and service.

☛ Oberdorfer is still old-fashioned in being owned and managed by a local family—but completely up to date in the way our production is readily adapted to market demands and technical advances in our field.

☛ Factory personnel at Oberdorfer is directed by ten superintendents whose length of unbroken service averages 24 years. It is the kind of pride they and their men take in the quality of *their production* that has permitted us to develop such mutually satisfactory manufacturer-customer relationships with our thousands of accounts all over the world.

☛ Oberdorfer has raised pump prices only once in the past ten years (in 1947, and then only 15%)—and that at a time *when our available supply met market demands.*

☛ You wouldn't buy pumps without checking competitive features. It will pay you to check the manufacturing companies' records as well before you buy.

The outstanding spraying equipment manufacturers know Oberdorfer's record—and they are using Oberdorfer Pumps. Fill in and mail the coupon at right for a list of these manufacturers and the names of Oberdorfer Pump distributors in your vicinity.

Order your pumps and spray equipment now. Again this year, there will not be enough to go around.

Agricultural Pump Division
Oberdorfer Foundries, Inc., Syracuse, N. Y.

Agricultural Pump Division, Oberdorfer Foundries, Inc.
5600 Thompson Road, Syracuse, N. Y.

Please send me without charge or obligation a list of spraying equipment manufacturers using Oberdorfer Pumps, and the names of distributors in my vicinity.

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For dependable blight control

use CRAG Trade-Mark POTATO FUNGICIDE (658)

the modern inorganic fungicide

For the control of early blight and late blight, this potato fungicide is applied as a spray at the rate of 1½ to 2 lb. per 100 gal. of water and as a dust at 3 lb. per acre. Deposits on foliage are chemically stable and resistant to weathering.

CRAG Potato Fungicide, a greenish-yellow copper zinc chromate, is a free-flowing wettable powder. It is chemically stable in storage. This fungicide is compatible with DDT and is readily dispersed in spray tanks—no additives are required. Its aqueous suspensions are less corrosive to spray equipment than water itself. CRAG Potato Fungicide is easily formulated into dusts merely by mixing with inert diluents, such as pyrophyllite or talc.

This new inorganic fungicide may also prove of value in the control of diseases on melons, cucumbers, celery, citrus, ornamentals and other plants.

Availability: now commercially available as a potato spray fungicide or for compounding fungicidal dusts. Write for technical bulletin F-7053.

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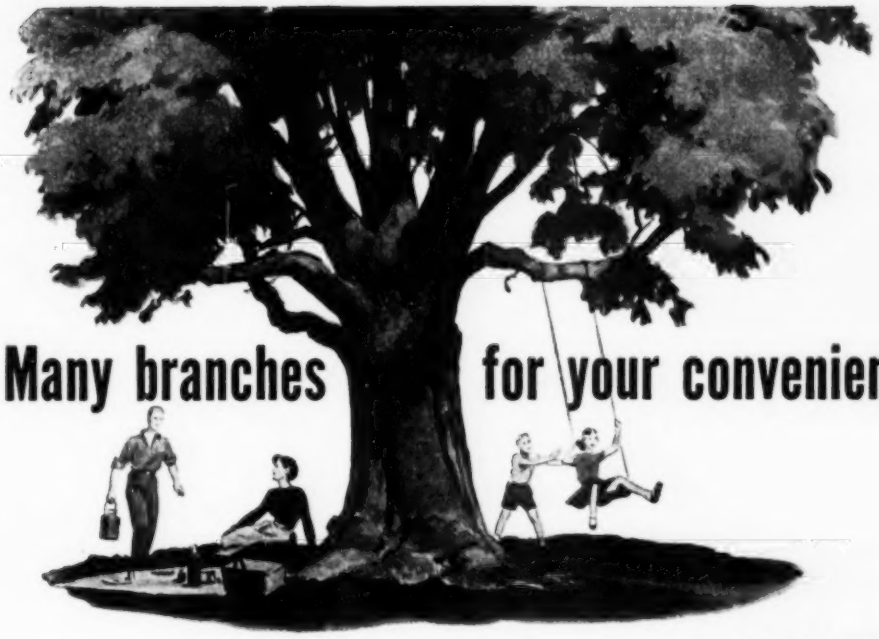

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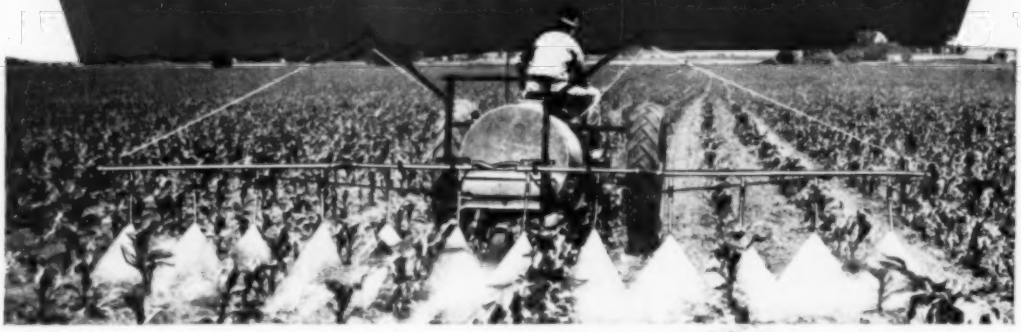

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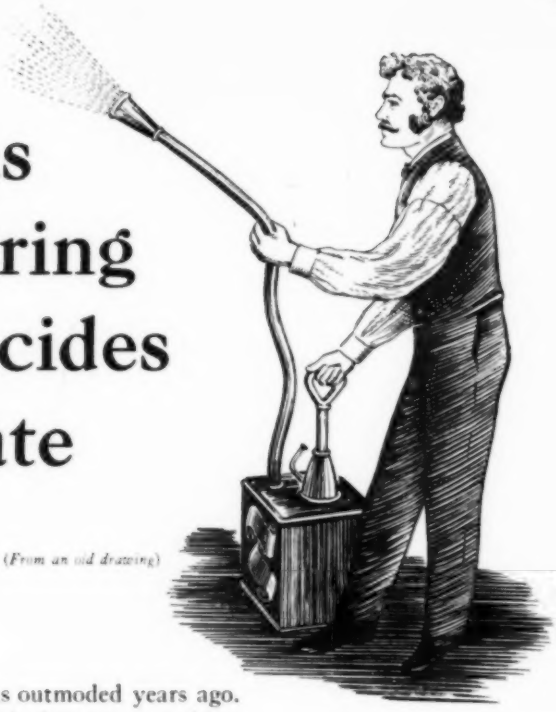

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THE EDITOR COMMENTS

FAILURE of the Tennessee Valley Authority to "contribute anything substantial to the cheapening of production of fertilizer materials" was cited in the recent report of Paul O. Peters, investigator for the Small Business Committee of the House of Representatives. Upon examination of the books and accounting records of TVA, he found that the total operating expenses for the fiscal year of 1947 were $15,409,373; total income from sales to cooperatives and others amounted to $11,510,904; fertilizers used in tests and demonstrations cost $2,431,366; chemical products used in other TVA activities cost $36,269; leaving $1,430,834 of the operating expense to be met from other income to TVA or from operating funds. The investigator added that by strict commercial standards, TVA's chemical plant operations were conducted at a loss of almost 4 million dollars in 1947.

The loss, however, which in this instance was called "net expense," was accounted for in the services rendered through experimental work and the contribution of fertilizers for tests and demonstrations. Peters said that in balancing the books, TVA accountants followed practices which would not be countenanced in private industry.

Congress had charged TVA to "utilize the Muscle Shoals properties as far as may be necessary to improve, increase and cheapen the production of fertilizer and fertilizer ingredients," Mr. Peters reminded. He then pointed out that in so-doing, TVA was authorized to use any process or processes that in its judgment appeared wise and profitable for the fixation of atmospheric nitrogen. The investigator opined that from the records it cannot be shown that TVA has achieved the objectives in cheapening the process for producing ammonium nitrate.

Somewhat the same story is true in the case of superphosphate, according to the report. During World War II, while fertilizers were being requisitioned from both private industry and TVA for shipment abroad, private industry operating under OPA supplied triple superphosphate f.o.b. Tennessee production points at 75c per unit of P_2O_5, while at the same time, the Treasury Procurement Division was billed as high as $1.01 per unit by TVA. Mr. Peters concludes, as should anyone faced with this evidence, that TVA has not contributed substantially to cheapening the production of fertilizer and fertilizer ingredients.

From the standpoint of the independent fertilizer manufacturer who must contribute taxes to help make up TVA losses, it is small wonder that so much resentment is felt in the trade . . . particularly when fertilizer is often handed out free to many potential customers.

Aside from the commercial angle, one's eyebrows lift when it comes to consideration of the social aspects of the matter. The tendency is definitely toward more and more government competition in business . . . and often on a grandiose scale, deficits of which are made up by increased taxes. The American fertilizer industry, by and large, wants no part of it. Far-seeing consumers, too, should give deep thought to the trend, lest they should, to twist the old saying, "sell their birthright for a mess of potash."

ALTHOUGH damage caused by the European corn borer in 1948 totaled a staggering $103,000,000, involving some 85,500,000 bushels of corn, U.S.D.A. entomologists state that in view of the continual expansion of the pest more deeply into the corn-growing regions, the year of peak damage is yet to

come. According to U.S.D.A. spokesmen, heaviest damage is likely to occur when the borer is generally distributed and there come seasons which favor development of the insect.

Such an outlook in no way reflects on the progress made by entomologists in control of the pest, as might be gathered from a superficial glance. As a matter of fact, had it not been for careful study on the part of entomologists representing both Government and industry, the loss would most certainly have been extremely serious; perhaps to the point of causing an acute shortage of corn in the U.S.

The situation serves notice that despite the existence of a number of insecticidal materials which will control the borer successfully, much more effort must be put forth to get these materials into universal use. Education is the logical answer . . . education which will make the farmer know that to control borers and other pests, toxicants must be applied **early** in the season. If a farmer waits until infestation has already begun, his frantic efforts at control are likely to be unavailing. It's the old, old "ounce of prevention" idea . . . containers of insecticides parked on dealers' shelves can't control any kind of pest. The obvious problem is to get the materials applied **where** they are needed, **when** they are needed.

Solution of this problem therefore seems to lie beyond the realm of mere scientific research. It is one which must be tackled by good merchandising. The custom sprayer can play an important part by selling the farmer on scientific control with modern application equipment.

RESEARCH on insect control is continuing at an increasing pace, it is noted in the annual report by Dr. P. N. Annand, Chief of the Bureau of Entomology, U. S. Department of Agriculture. The report reviewed progress made in 1948 on control of various pests, stating that successful chemical measures had been developed against corn borer, grasshopper, codling moth, cotton insects, and a considerable assortment of other pests of economic importance.

Among the advances gained in 1948 was the recommendation of DDT for control of European corn borer, which incidentally, is spreading more and more deeply into the corn belt; the use of chlordane and toxaphene for grasshopper control; the application of three DDT sprays for codling moth control as compared to 6 or more of formerly used insecticides; control of such pests as orchard mites, red-banded leaf roller, pear psylla and certain scale insects with parathion.

As a supplement to the chemical aspect of pest control, the development of improved application equipment has also been noted during the past year. Portable power sprayers have been used on trees infested with bark beetles, where formerly hand equipment had been used. The latter machines not only do a better job, the reports states, but also reduce costs.

Aerial application of DDT at the rate of 1 pound per acre has been found to be of little danger to wildlife including fish, birds and mammals, while saving forests from insect pests. Studies of the problems have been carried out by the B.E.P.Q. in cooperation with the Fish and Wildlife Service, the report says.

It is encouraging to see that many of the newer organic insecticides are finding their level in the agricultural pest control field, and in many cases are acting as **supplements** rather than substitutes for certain of the older standbys. The number of pests yet to be controlled is indicative of the amount of research which remains to be done.

The report for 1949 will no doubt carry the story of more discoveries and further success. In the meantime, the American chemical industry is keeping alert to the needs of agriculture, and is continuing to screen and test new preparations.

Guest Editorial written especially for this issue of Agricultural Chemicals.

Radioactive Confusion

by Dr. L. T. Alexander

U.S.D.A., Bureau of Plant Industry, Soils and Agricultural Engineering; Beltsville, Maryland

AT the present time an unfortunate state of confusion seems to exist in the minds of many people regarding two distinctly different uses of radioactive materials in the realm of soils and fertilizers. The lack of clear understanding of these two uses is a potential deterrent to the development and application of recent advances in the field of atomic energy to certain soil and crop production problems.

Isotopic tracers or "tagged atoms" have been used enough in soil and fertilizer research to prove that they can be an exceedingly useful tool in evaluating fertilizer materials and placement methods and in determining the function of nutrient elements in the plant. These uses are based on the fact that the radioactive form of a given element can be followed or traced because of the alpha, beta or gamma rays that are given off when that element "decays" radioactively. Only a tiny fraction of the total number of atoms of phosphorus used in a radioactive experiment with plants are radioactive and only a certain portion of the radioactive ones "decay" in a given period of time. So far as scientists have been able to determine, the radiations that are so useful in tracing the phosphorus in fertilizer, soil and plant have no effect, either favorable or unfavorable, on plant growth.

Another possible use of radioactive materials that has intrigued man ever since the discovery of radioactivity, is the question of whether radiation produces any direct stimulation of plant growth. Many people have believed that they have found benefits to plants both in amount of crop obtained and in quality of the product, and many have also believed that animals were benefited by low levels of radiation.

The materials that have been most frequently sug-

(*Continued on page* 53)

The Value of Trace Elements in FERTILIZERS

THE value of trace elements in plant and animal nutrition has been the subject of increasing research during the past few years. Papers on this comparatively new subject are second in number only to those on DDT and plant growth substances. The term "trace element," or preferably, "micronutrient," is applied to those elements which are present in the plant or animal body in minute amounts but are at the same time essential to its growth or reproduction. The eight elements commonly regarded as micronutrients are copper, manganese, zinc, iron, boron, iodine, cobalt, and molybdenum, although sulphur and magnesium, essential also in somewhat greater amounts, are frequently included in this category.

All of these elements are found in plant tissue and, with the exception of iodine and cobalt, have been proved to be necessary to plant life. Iodine and cobalt, although they go along in the plant "just for the ride", are by this means made available to animals to which they are essential. These two elements are not the only ones that are carried along as "excess baggage". Aluminum and silicon, two of the most abundant elements in the earth's crust, are usually found in relative abundance in a plant's ash, along with lesser amounts of other nonessentials. In fact, up to the present time, approximately sixty elements have been positively identified in plants and it is possible that most of the remainder may eventually be found when analytical methods of greater sensitivity are developed. With improved methods of purification of nutrient media, we may have to add several doubtful elements such as fluorine, gallium, aluminum, and silicon to our list of essentials for plant or animal nutrition.

The proportion of an element in the ash of a plant is not indicative of its relative value to the organism. The percentage of aluminum or chlorine, neither of which has ever been proved to be absolutely essential, may be far greater than the percentage of copper, zinc, or other elements, without which the plant cannot develop normally. In addition, there exist, in unusual cases, the so-called accumulator species of plants. These are capable of absorbing inordinately large amounts of certain elements, such as selenium, zinc, aluminum, or silicon. Among the best examples are species of the leguminous genus *Astragalus*, which may accumulate from 800 to as much as 15,000 parts per million of selenium in seleniferous areas, while the surrounding vegetation contains 30 parts per million or less.

Prior to the first World War, iodine and iron were the only trace elements known to be necessary biologically, if we except sulphur and magnesium. In fact, the last three of these elements, along with the macronutrients, carbon, oxygen, hydrogen, nitrogen, phosphorous, potassium, and calcium, were all that were deemed essential for plant growth. For animals, the addition of sodium, chlorine, and iodine was also thought necessary, but the several others that were known to be present in the ash, including magnesium, were held to be superfluous.

Then in 1922, manganese was proved to be indispensible to plants. Earlier experiments had been uncertain because the salts used as a source of iron were invariably contaminated. The need for manganese in animals was demonstrated later.

In 1926, both zinc and boron were proved to be plant requisites. Next it was shown, by a series of experiments dating from 1928, that although copper is not actually a constituent of hemoglobin, a small amount is needed, along with iron, for hemoglobin formation. The essentiality of the element to plants was first demonstrated six years later. Except for the need of gallium for certain fungi, Molybdenum completes our known mineral requisites for plants. It was "admitted to the fold" in 1939. The last of the elements found necessary for animals, so far as our present understanding is concerned, were magnesium (1932), zinc, and cobalt (both 1935).

Thus it may be seen that practically all the knowledge of the need of trace elements has developed in the past twenty years, and literature on the subject is now increasing at a geometric rate.

by

Frank C. Gilbert

Battelle Memorial Institute
Columbus, Ohio

Problem Old or New?

IN observing the growing amount of literature on the subject, the question naturally arises whether the trace element problem is a recent one. Does it occur because of greater drains on our land by continuous cropping and improved crops, or is it an old problem of which we have only recently become aware? The answer is that both factors are pertinent.

Our soils were not equally productive, even before the settlement of the pioneers who wrested the land from the aborigines. One common misconception is that virgin soil, or land after the clearing of a forest, is always fertile. There is no absolute relationship between the original potentiality of a soil and its present productivity, and it has been shown that response to management is more important than primary value in most cases. Some of the most productive soils in the United States are in the southeastern region, soils that, when first cultivated, were notoriously infertile as compared to the black soils of the Middle West.

However, practically all land, even that of limited natural mineral content, would grow fair crops provided that the buffering organic matter and nutrient elements were returned to the soil where they could be used again in the natural cycle of growth and decay. By means of the wasteful agricultural practices, which still prevail in many sections of the country, a large part of the land was despoiled, insofar as its ability to produce a good crop was concerned. Some land was ruined beyond recovery by erosion, which stripped the soil almost down to the native rock or gullied it so badly that reclamation was impracticable. The better soils took longer to ruin, but even some of these became so depleted that they were later abandoned.

The first required elements to become depleted in overworked soils, were those most soluble or needed in greatest abundance. The supply of trace elements, required only in small amounts, but without which plants could not grow satisfactorily, took much longer to exhaust. Formerly, the requirement for greater amounts of nitrogen, phosphorus, potash, and lime obscured the need for these trace elements.

With the early use of fertilizers, proportional, but much smaller, amounts of the micronutrients were involuntarily applied. This was especially true when much of the fertilizer used was organic. Animal manures and fertilizers, such as fish meal, are rich in micronutrients, including copper, zinc, and manganese. So long as organic soil foods like these were used in abundance, there was no micronutrient problem. Even after such organic fertilizers became scarce, or, because of increasing agricultural demand, were used in proportionately smaller amounts, the need for trace element amendments to the soil was delayed somewhat because of the use of low-analysis fertilizers. These usually contained nitrogen in organic form and frequently supplied enough micronutrients to satisfy plant needs on most soils.

Effect of High Analysis

IN recent years, however, much effort has been expended in an attempt to manufacture and to develop fertilizers that carry thirty per cent or more of the major plant nutrients. The low-analysis fertilizers of a number of years ago frequently contained no more than ten or twelve per cent of these nutrients, which was gradually increased to the usual twenty per cent content of most fertilizers today. Concentrated fertilizers have a distinct advantage over those of lower analysis in a saving of transportation and handling charges per unit of plant food. However, the more concentrated the fertilizer, the less is the probability that it will contain traces of micronutrients.

Thus, it may be seen that the need for applications of trace elements to many agricultural soils is becoming more and more urgent as the trace elements are being proportionately extracted from the soil with the macronutrients and are not being proportionately replaced as fertilizers are applied to these soils. But few experiments have been made to compare the amount of a micronutrient taken out of the soil by a crop with the amount replaced by the fertilizer used in promoting the growth of that crop. However, one such experiment in North Carolina, with tobacco, demonstrated that in this particular case about five times as much copper was removed by the crop as was returned as traces in the fertilizer.

This figure cannot be considered as representing a typical amount if one bears in mind the variation in the traces of copper in commercial fertilizers, the difference in the percentages of

Peach trees which have received copper, zinc, manganese, boron and magnesium, in addition to lime and fertilizer.

This row of peach trees received only lime and fertilizer without the so-called "minors."

this element that may be found in tobacco or other crops, the differences in crop yields, and the amounts of fertilizer applied in different localities.

The micronutrient contents of commercial fertilizers vary a great deal. In most brands, the amounts present as traces are unknown and perhaps differ considerably in similar lots. Analyses of five different fertilizers showed the copper content to vary from 5 p.p.m. to several times that amount. The quantity of trace elements in tobacco and in other crops is also very variable. The mean copper contents of tobacco leaves from two nearby localities in North Carolina, were 7.31 p.p.m., and 16.07 p.p.m. The recent experiments of Bear and his associates (*2*) have thrown much light on this subject. They found, in experiment with samples of vegetables from ten states, extending from Georgia to New York and from Virginia to Colorado, that there were wide variations in the mineral content of vegetables of the same variety. They also found that the cation-equivalent and trace element values, with the exception of manganese, tended to increase from East to West. The extremes of copper in p.p.m. in the case of snap beans, were 60 to 3, tomatoes 53 to 0.0., cabbage 48 to 0.4, lettuce 60 to 3, and spinach 32 to 0.5. The most extreme values were in the amounts of iron in tomatoes and in spinach, which were 1938 to 1 in tomatoes, and 1584 to 19 in spinach.

The amount of trace elements removed by crops also differs according to the yield. For instance, a tobacco crop producing 2400 lbs. of leaf per acre will, in most cases, remove a proportionately greater amount of trace elements than a crop yielding only 1000 lbs. If the per cent of the different elements does not vary, the heavier crop, in this case, would remove nearly two and one-half times as much nutrient material as the lighter.

The fertilizer used must be taken into consideration, also, and has a substantial effect on the rapidity with which the trace elements are depleted. Fertilization with a high-analysis product, even if ample with regard to N, P, and K, does not always return the required micronutrients to the soil. Manures and other organic fertilizers rich in trace elements are not always used, even where available. Several instances may be cited where accumulated manure is sold off the farm for cash and a proportion of the value received spent for commercial fertilizer. This shortsighted policy is, of course, advantageous for the buyer of the manure but, eventually, will have its effect on the farms from which the organic matter is removed. In defense of most present-day American farmers, it may be said that the cases mentioned above pertain to a few short-term tenant farmers who are out to make a "killing" because of the present high agricultural prices.

Where Deficiency Occurs

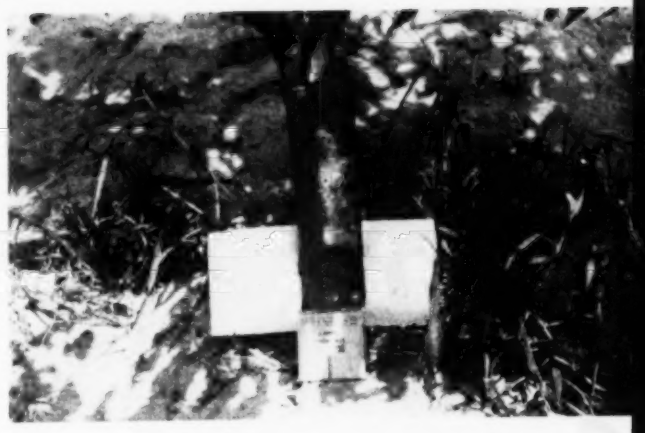
CERTAIN parts of the world are known to have been deficient in macronutrients from the time these areas were placed under cultivation. This is undoubtedly true of the micronutrients as well. However, our knowledge of micronutrient geography is so recent and covers such a small area that it is virtually an unexplored field. Most of our multiple trace element deficiencies seem to be concentrated on coastal plain areas and in regions of old soils, such as parts of Australia and New Zealand. All of these localities have been heavily leached

The Atlantic coastal plan, at one place or another, has shown a deficiency of every known trace element except sulfur, iodine, and molybdenum. Knowledge of molybdenum is so incomplete, that further studies may show that a deficiency of this element also occurs. So little work has been done in the past that it is not possible to determine to just what degree our coastal plain and other soils were deficient when first brought under cultivation, and how much the decreasing production that followed was due to a lack of trace elements. Unrecognized deficiency symptoms are usually blamed on fungi or insects and there is no way to determine when they first appeared in areas under cultivation for a long period.

Deficiences are seldom severe enough, under natural conditions, to prevent the growth of all species of plants. However, slight variations in the mineral content of a soil are sufficient to insure or prevent the dominance of certain species. Field botanists are familiar with plant associations and frequently are able to tell accurately by identifying the plants thereon, where one type of soil begins and another ends. Such plant species are called indicator plants and may be indicative of a high or low pH, a saline condition, the presence or absence of certain elements, or other ecological factors. Well-known examples of such indicator plants are *Rhododendron* and sorrell on acid soils, greasewood on alkali soils of the west, and species of *Spartina* on the salt marsh. *Astragalus*, an accumulator of selenium and an indicator of seleniferous soils, has already been mentioned. Species of *Andropogon*, such as *A. fucartus* and *A. scoparius* are indicative of worn acid soils of the midwest. These grasses, colloquially called "broom sedge", have a low mineral requirement and, in turn, are of low nutritive value. They gradually replace more valuable species on soils approaching depletion, but are quickly eliminated by more nutritious species when the soil on which they are growing is limed and fertilized.

The lack of one or more trace elements may also affect plant associations. We have little information on this subject and most of what we have is quite recent. Tolerance or intolerance to low amounts of a trace ele-

(*Turn to page 73*)



This peach tree trunk received trace elements. Extra growth results.

Contrast this trunk with above. This one had no trace elements.

Northeastern Weed Group Discusses

NEW CHEMICALS

NUMEROUS phases of chemical weed control including application, formulation and new materials were discussed at the annual meeting of the Northeastern Weed Control Conference January 5-7 at the New Yorker Hotel, New York. The group elected as president for 1948, Dr. Robert D Sweet, Cornell University, Ithaca, N.Y. Dr. Sweet succeeds Dr. G. H. Ahlgren, Rutgers University, New Brunswick, N.J. Other officers named included Dr. H. L. Yowell, Esso Corp., Elizabeth, N.J., vice-president and Dale E. Wolf, Rutgers University, secretary-treasurer. They succeeded Dr. B. H. Grigsby, Michigan State College, E. Lansing, Mich. and Dr. Sweet, respectively.

To sum up the meeting before going into the details of some of the talks, it was evident that chemical weed killers continued to hold the preponderance of interest, with forty-five out of the forty-nine papers dealing directly with the use of herbicides.

Two new weed killers were announced and mention was made of several others. The two new ones were sodium 2-(2,4-dichlorophenoxy) ethyl sulfate and sodium isopropyl xanthate. These announcements appeared to be indicative of a heightening of interest in the technical aspects of chemical weed control. The physiology and biochemistry of herbicide use was stressed in a number of papers, and announcements were made of improvements in the use of some of the older herbicides.

The meeting opened on Wednesday morning with an address of welcome by the Conference president, Dr. Ahlgren. Dr. K. S. Quisenberry, U.S.D.A., Beltsville, Md., told the group of plans for coordinated research. He reviewed the history of weed research, and emphasized that basic research is a primary function of such projects. Such research is expected to provide "a better understanding of the principles and thereby lead to more effective, economical, safe and practical methods of control," he said.

The scope of weed control research is national and even international, Dr. Quisenberry stated. He reported that the foundation for a national program is now being laid and that State, Federal and commercial

Left: New president of Northeastern Weed Control Conference, Dr. R. D. Sweet, Cornell University (L) is congratulated by the outgoing president, Dr. G. H. Ahlgren, Rutgers University.

Right: Part of the group attending the annual banquet at the New Yorker Hotel on the evening of January 6.

Right: Newly-elected officers of the Northeastern Weed Conference: left to right: H. L. Yowell, vice-president; Dr. Sweet, president; and Dale E. Wolf, secretary-treasurer.

agencies will participate in the program. Efficient handling of data will be sought so that duplication might be avoided, and necessary replication encouraged. He concluded by stating that the prospect for such a program is "stimulating, encouraging and interesting . . and if it progresses as it should, it will supply much information and be a real example of the value of cooperation in agricultural research."

L. W. Kephart, in charge of weed investigation, U.S.D.A., scheduled to speak on "Weed Research—why, what, where and by whom", presented a paper written earlier by W. C. Dutton, Dow Chemical Co., Midland, Mich. It covered the industrial viewpoint in weed research, starting at the beginning of a given product and pointing out how each preparation must stand or fall on its own merit. The screening of new compounds is usually done by industry or by some private or semi-private agency, he said, although there are instances where work of this type is done by or under the direction of workers with industry support.

"Cooperation in the late stages of development takes many forms", he declared. It may consist of manufacturers supplying materials to experiment station workers and others for trial tests, or "grants in aid" which often give researchers additional latitude and enable them to extend projects which would otherwise be limited. The writer remarked in his paper that since leaving the public payroll to join a commercial firm, he has found "that the research program of industry is just as sound and well directed as that of any public institution. We are told in our work with agricultural chemicals to 'get the facts, no matter what they are or whether we like them or not.' Research is the background for most sales programs and no sales program can proceed for long if it is not on a sound basis."

The paper was summed up by the statement that cooperation in research with agricultural chemicals between industry and public workers is desirable and beneficial to both.

Plant Physiology

JOHN W. MITCHELL, U.S.D.A. Bureau of Plant Industry, discussed the role of physiological research in chemical weed control. He pointed out that the field of research in this field is divided into four fields: absorption and translocation of 2,4-D; specificity; mechanism of action; and the molecular struc-

ture of a chemical and its weed-killing properties.

In discussing absorption and translocation of 2,4-D, Dr. Mitchell stated that when the material is applied to the leaf, the toxicant is translocated to the stem where it is moved both upward and downward, finally accumulating in developing buds, leaves and root tips. This movement of 2,4-D takes places most readily when the plant is translocating carbohydrates in the same direction.

Just why 2,4-D will kill one plant and not harm another closely-related species is not clearly known. Not only in weed control is this specificity noted, but also in the use of 2,4-D in preventing the preharvest drop of fruit. At a concentration as low as 10 ppm, 2,4-D will stop the fall of Winesap and Stayman Winesap apples at harvest time, but it has practically no effect on many other apple varieties even when applied stronger.

The mechanics of *how* 2,4-D kills a plant has remained in question since the herbicide was discovered. Although progress has been made, Dr. Mitchell pointed out, no one as yet has the complete picture. However, it has been reported by several investigators, that the chemical affects the rate at which plants use up their reserve food supply. Studies have indicated accelerated activity of enzymes to break down reserves of starches and dextrins in the plant, but the evidence is indirect thus far. In attempts to find why the plant uses its reserves so rapidly, it was observed that the rate of respiration of test plants treated with 2,4-D was higher than that of untreated plants. This increased rate began within an hour after 2,4-D had been applied to some test plants, and continued to increase for a day or two, reaching a rate 85 percent above that of untreated plants. In about 5 days, the plants had apparently exhausted their reserves, and respiration dropped to almost zero. Treated plants failed to grow and could not synthe size solid material. But their respiration rate, or that at which they burned up reserve food materials, was almost doubled. It was also observed that treated plants used more oxygen; which had the effect, Dr. Mitchell said, similar to that of fanning a fire without adding more fuel. Under such a condition, neither plant nor animal could survive for long, he observed.

New Herbicides

A NEW chemical for use in pre-emergence weeding was described in a paper by L. J. King, Boyce Thompson Institute, Yonkers, N.Y. and J. A. Lambrech, Carbide & Carbon Chemicals Corp., S. Charleston, W. Va. The new material, Sodium 2-(2,4-dichlorophenoxy) ethyl sulfate, also known as "Experimental Herbicide No. 1", is a germinative toxicant for weed sales when applied to the soil. Its action is entirely different than that of 2,4-D in that when applied to the foliage of sensitive plants, no epinastic responses and only slight formative effects are noted. The paper pointed out that draft hazards are eliminated with use of this material

Physically, the material is a free-flowing white powder, offering no formulation difficulties since it is freely soluble in soft water. In comparative tests with 2,4-D, No. 1 displayed almost none of the usual hormone responses shown by 2,4-D on sensitive plants. When the two were applied to the surfaces of sensitive plants such as tomatoes, 2,4-D caused severe reduction in growth, while with the new material such action was slight. However, when No. 1 was applied to the soil, its action on growing plants is more nearly similar to 2,4-D, although even then it is less normal.

Another paper presented at the Wednesday session was titled "Factors Affecting the Action of 2,4-D" by Charles Hamner, Michigan State College. He reported results of tests with 2,4-D using in connection various enzymes, amino acids and ascorbic acid. Another interesting development, he reported, was in connection with the use of a vinyl resin latex which enabled 2,4-D to kill weeds at a reduced concentration. Experiments on a golf course, for instance, showed that as low an amount as ¼ pound of 2,4-D per acre could be used to produce a permanent kill of dandelions without injury to the grass when the chemical was combined with a 10 percent solution of the latex. With other commercial formulations, it was necessary to use 1½ pounds of 2,4-D per acre to obtain similar results.

Thursday's Session

THURSDAY mornings' program was divided into two sections. The first, on Horticultural crops, was under the chairmanship of Dr. B. H. Grigsby, Michigan State College. The other section, on Agronomic crops, Turf and Miscellaneous, was headed by Dale E. Wolf. In the former section, Dr. A. E. Prince, Maine Agricultural Experiment Station, described control of woody plant weeds in blueberries. Tests had been conducted in both 1947 and 1948 with herbicides furnished by various manufacturers. In the 1948 tests, the materials applied as a spray were used at a concentration of 2,000 ppm, 2,4-D acid equivalent. Although much more data are needed before definite statements are made, it appeared that not all of the 2,4-D materials affected all weed species in the same way, Dr. Prince reported. For instance, sheeplaurel weed is killed by the isopropyl ester, butyl ester and the morpholine salt, but is not killed by the ammonium salt, triethanolamine salt nor the sodium salt. Rhodora, on the other hand, is killed by the am-

monium salt, sodium salt, isopropyl ester and butyl ester, but is not killed by the triethanolamine salt nor the morpholine salt, he said.

Control of alders was obtained by spraying thoroughly when the plants were three feet tall. Plants more than this height were harder to kill, and required much heavier application, he stated. This is because sprouts may appear from the roots and much more material is required to cover the entire plant.

A similar report was made by F. A. Gilbert, Rutgers University, who told of experiments on weed control in strawberries. The tests, of limited scope, indicated that sprays of 2,4-D at a concentration of 1 pound acid per acre are practical applied when growth is just starting in the spring, if the weeds involved are susceptible to the herbicide. If the unwanted plants consist largely of grasses, results with 2,4-D will be disappointing. In the second phase of the tests, Mr. Gilbert reported that excellent control of weeds was obtained with the amine salt of 2,4-D at 1 pound per acre, applied five days after cultivation with Redwing strawberries. The spray was applied just as the weed and grass seed were germinating. When the spray was applied approximately 20 days after cultivation, crabgrass became a major problem.

It was pointed out that these limited tests indicate that 2,4-D for control of weeds in strawberries is feasible under special conditions with proper management. It should be remembered also, the author says, that these tests were made only with two varieties of strawberries.

Horticultural Crops

THE afternoon session on Horticultural crops was under the direction of Dr. Prince, Maine Agri. Station. During this period, the chemical control of weeds in sweet corn and asparagus was discussed in a paper by E. M. Rahn and C. E. Schell, Delaware Experiment Station, Newark. Equally good weed control was obtained with 1½ pound pre-emergence, 2,4-D applications of any of four forms; acid, sodium salt, ethyl ester and alkanolamine salt. No injury to the seedlings was noted except in the case of the ester. This injury disappeared within a week, however, the authors reported.

A ¾ pound post-emergence application when the corn was a foot tall resulted in good weed control except for crabgrass, while a similar 2,4-D application in a 1:4000 solution of phenyl mercuric acetate resulted in good control of crabgrass at the expense of some injury to the lower leaves of corn. Although the corn appeared to outgrow this injury, the authors stated that further research on the use of PMAS is necessary. Pre-emergence applications of 2, 4,5-T at 1½ and 3 pound rates gave slightly better weed control, particularly of crab grass, than did equal applications of 2,4-D. The former caused more seedling injury, however.

The productivity of cultivated and uncultivated corn weeded with post-emergence sprays of 2,4-D was reported by C. H. Dearborn, New York State Agricultural Experiment Station, Geneva, N.Y. After four experiments with Golden Cross Bantam Sweet corn weeded with 2,4-D, the results showed that cultivation in conjunction with 2,4-D is necessary in the production of sweet corn where grasses and other weeds persist after spraying with 2,4-D. There is some indication that the productivity of sweet corn is improved by a cultivation to break up the 2,4-D layer on the surface of the ground when the post-emergence treatment exceeds 0.7 of a pound per acre of 2,4-D acid equivalent, the paper said.

In the morning session under Dale E. Wolf, Walter C. Jacob, Long Island Vegetable Research Farm, Riverhead, L.I., presented a paper on chemical control of weeds in L.I. potatoes. Six materials at three rates of application were used in the experiments. Materials included the sodium salt and triethanolamine salts of 2,4-D; and four commercial preparations. Post emergence applications of most of the materials injured the crop and reduced the yield even though weed control was excellent, Mr. Jacob reported. None of the plots treated with weed control chemicals yielded as well as did the normally cultivated plots. From the standpoint of optimum weed control with minimum crop injury, materials should be applied as near as possible to time of emergence of the potatoes, it was concluded. One factor which was pointed out was that the early part of the 1948 season was very wet and as a result, 2,4-D was more injurious than previously noted.

A report of effects observed from the use of 2,4-D in varied field trials was made in a paper by John D. VanGeluwe and Anthony J. Tafure, Cooperative GLF Exchange, Inc., Ithaca, N.Y. The materials used in the tests were triethanolamine salt, soddium salt and various ester formulations. Pre-emergence and post-emergence applications were made on sweet and field corn, potatoes and asparagus, and post-emergence sprays were applied on small grains. In general, the report said, pre-emergence applications at 1 lb. of 2,4-D per acre controlled weeds for 2 to 3 weeks, while 2 lbs. per acre controlled broad leaf weeds as long as 6 weeks.

Soil moisture and soil types were an important factor in the effectiveness of 2,4-D and injury to the crops from its use, and weather conditions immedi-

ately following application also played a part in control. Sweet corn had a definite varietal response to 2,4-D injury whereas field corn varieties showed less differences in resistance. Weed control was good in plots of Katahdin potatoes, except severe injury was observed when spray was applied to potatoes planted on light sandy soil.

The authors reported further that pre-emergence sprays on corn plantings over 1½ feet tall showed more tendency for injury of bracer roots, leaf curling and brittle stalk injury. It was noted that injury was proportional to the height of the corn plant and the 2,4-D concentration being used.

Small grains (not seeded) sprayed with 2,4-D after they were fully tillered up to jointing time gave good results when concentrations were used not exceeding 1 pound of 2,4-D per ½ acre.

Development of low pressure low volume spray equipment for the application of 2,4-D and other herbicides to turf was described in a paper by A. M. S. Pridham, P. B. Kaufman and E. B. Wahlgren, Cornell Univeristy. The presentation was made largely by way of slides which showed the features of applicators with which experiments have been conducted at Cornell. According to the authors, certain points should be emphasized in judging the utility of applicators. They recommended that the machine should have an easily-accessible shut-off valve to prevent drip; a means by which the operator can tell whether or not the material is passing through the lines; and a series of strainers to prevent foreign material from clogging the nozzles. The ideal machine, the authors said, should have the spray boom placed behind mower blades so that it will not be damaged by collision with objects, and also that the stream may be directed beneath the arch of cut grass leaving the mower blades. They also recommend the cleaning of nozzles after each operation. This should be done with kerosene, then soap and water with the aid of a small brush.

As a source of pressure, a hand-pumped 3½ gallon spray can has been used successfully, it was stated. On a gang mower, however, an air compressor appears to be a satisfactory device.

Annual Banquet Held

THURSDAY night's program consisted of the annual banquet, at which Dr. Quisenberry acted as master of ceremonies. Speaker of the evening was Wheeler McMillan, editor of *The Farm Journal*, Philadelphia. He lauded the strides taken by research workers in solving many of the problems of agriculture, and stated that such work must continue on even broader projects. He recalled his own experiences as a boy on the farm, and pointed out how "muscle" work in agriculture has decreased since those days. "We haven't yet learned all about agriculture . . . we have not yet begun to dream what riches plants have for man", he declared. He pointed out that out of some 300,000 species of plants known to science, only about 150 furnish the world with food and fiber. Mr. McMillan called on the chemist to give the world a glimmer of hope . . . to continue research so that there will be ample food for all. Conservation is important, he said, but of greater importance is creative ability in thinking and in action.

The final day of the Conference consisted of a paper-reading session in the morning under the chairmanship of Louis Evans, U.S.D.A., Beltsville, Md. L. V. Sherwood, Monsanto Chemical Co., St. Louis, Mo. described the use of pentachlorophenol as an herbicide, explaining that like 2,4-D, this material may also be applied in several forms. It may be used in its original state, or as the sodium salt, called sodium pentachlorophenate. Results are about the same regardless of which form is used, with a few exceptions, Mr. Sherwood said. The choice is whether the material is to be dissolved in oil or in water. Each may be used as a pre-emergence herbicide (before the weeds emerge), as a selective spray in certain crops, or for contact killing of emerged vegetation at all stages of growth.

Rates of application vary among investigators and commercial users, he said. Commercial applications of spray containing oil usually consist of 4 to 6 gallons of oil and from 2 to 5 pounds of pentachlorophenol per acre. Cost of materials as used in most commercial work, usually stays in the range of $1 to $3 per acre, he said. Pentachlorophenol or its salts can also be combined with other herbicides either to reduce the cost or decrease hazards. Combinations with 2,4-D have given good results in killing perennial grasses in certain areas, it was reported.

A. R. Hodgson, New Hampshire Agricultural Experiment Station, Durham, N.H. presented a preliminary report on quackgrass eradication with ammonium trichloroacetate and sodium tricholoracetate under field conditions. The two materials, "ATA" and "STA", respectively, were compared for herbicidal value and for the purpose of determining the conditions during late spring and summer for most effective application. The third objective was to discover the results of varying the concentrations and total amounts of the two chemicals at each time of application. Quackgress in all types of soils studied and at all times of application, was controlled by applications of ¾

(*Turn to page 78*)

Insecticidal Residues Subject At National Canners' Meeting

A NUMBER of papers covering toxicity, residues, and proper use of newer organic insecticides were presented at the National Canners' Association Convention held at Atlantic City, January 14-21. Dr. A. J. Lehman, chief, division of Pharmacology, Food and Drug Administration, discussed the toxicology of the newer agricultural chemicals. He pointed out that a wide variation exists between the ability of various insecticides to produce injury following the ingestion of a single dose. The organic phosphate compounds and nicotine are extremely poisonous and rapid in their action, he reminded. The lethanes and "thanite," while not as poisonous as the organic phosphates, do have a rapid effect, producing collapse and death in a few minutes. Of the chlorinated hydrocarbon insecticides, chlorinated camphene appears to be the most toxic, followed by the gamma isomer of benzene hexachloride and chlordane. The remaining compounds, including the pyrethrins and the insect activators N-propyl isome and piperonyl butoxide, have such a low toxicity that the hazards from ingesting an accidental dose of these materials appear to be of minor importance. Rotenone poisoning presents a considerable species variation. No cases of human poisoning have been reported, Dr. Lehman said, and it is probably safe to assume that man is among the less susceptible species to the toxic effects of this insecticide.

By dermal application, some of the insecticides are toxic to human beings, also. All of the compounds are more dangerous to handle when in solution than when in wettable powder or dust form. Exceptions are parathion and nicotine, however. Repeated exposures increase the hazards to as much as 200 times that of a single exposure, he warned, stating further that there is no immediate warning sign of impending danger since the organic phosphates are only slightly irritating to the skin.

One of the most important phases of the investigation on the hazards of insecticides is contamination of fruits and vegetables, Dr. Lehman pointed out. He emphasized the fact that chronic toxicity bears no relation to acute toxicity. The results of tests on rats were cited in this connection. It is not possible to administer a sufficient quantity of the beta isomer of benzene hexachloride, as a single oral dose, to kill a rat. However, when fed chronically, concentrations as low as 10 ppm in the diet, gross evidence of poisoning was produced.

Little is known of the hazards of aerosol formulations of chlordane, toxaphene and the organic phosphates, to mention a few, he said, so every precaution should be exercised in their use. Combinations of pyrethrins and rotenone with piperonyl butoxide and N-propyl isome, appear to be most safe. However, even with these, possible limitations await the outcome of the more prolonged laboratory tests.

Rohwer Warns of Misuse

DR. S. A. ROHWER, assistant chief, Bureau of Entomology and Plant Quarantine, U.S.D.A., spoke on the use and misuse of a number of the newer insecticides for canning crops. Dr. Rohwer pointed out the difficulty in making general statements on the subject, because of the wide variety of canning crops, the many areas in which they are grown, the number of insects which attack these crops, and the numerous ways in which the insecticidal chemicals may be formulated and applied. He emphasized the importance of how an insecticidal product is mixed, with what it is mixed, and how it behaves as an insecticide. "At present," he said, "It is not possible to write satisfactory specifications except for a limited number of combinations, and it is not possible to say that other combinations cannot be used. My advice to the grower is that he secure his insecticides from concerns that he is satisfied have experience and know how in testing and producing finished insecticides."

Dr. Rohwer reviewed the progress made in determining the effect of insecticides on the plant and on the productivity of the soil as well as on the natural enemies of the insects being controlled The complete answers are not known to many important questions regarding toxicity, residues and their effect on finished food products, he pointed out. Entomologists recognize this need, and in common with the grower, want food to be produced without harm to the farmer, his neighbors, or his land, the B.E.P.Q. assistant chief asserted. He then urged all users of insecticides to read and follow directions carefully, since these directions are based on actual data rather than guess work.

Dr. White Speaks

A THIRD speaker, Dr. W. H. White, Bureau of Entomology, U.S.D.A., discussed ways of avoiding harmful residues in vegetable crops. He reminded that many insecticides are as harmful to man as to insects, the difference being only in the amount necessary for a lethal dose. The investigations on washing produce and on crop growth in rela-

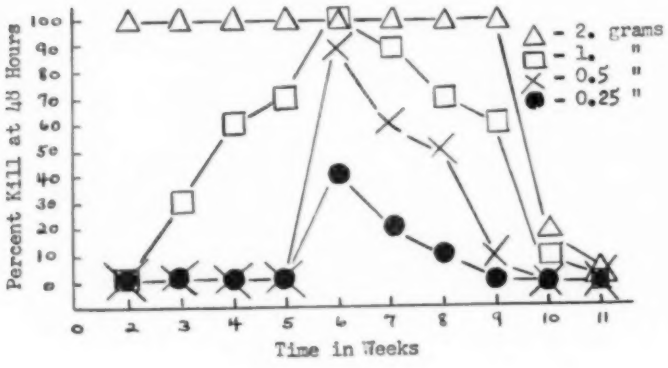
(*Turn to page* 53)

How Plants Absorb PARATHION

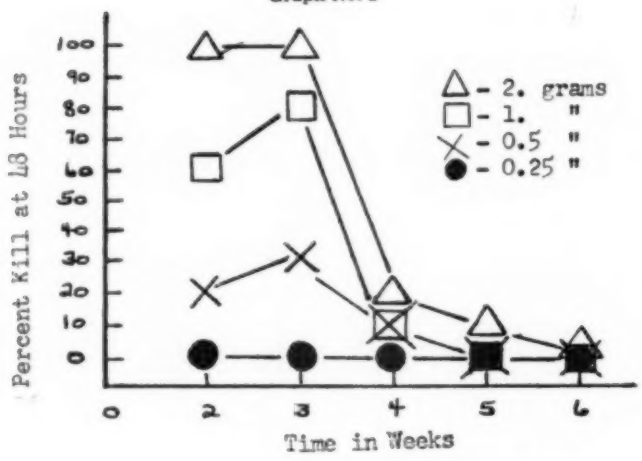
IS it possible for the root system of certain plants to absorb parathion and translocate it to the leaves or stems? If so, can the insecticide permeate the plant in quantities sufficient to be toxic to certain insects? The object of this paper[2] is to determine the answers to these questions, and also to observe any possible effect of parathion on sprouting of the seed and growth of the plants.

In the tests reported subsequently,[3] the parathion used was always in the form of a 15 percent wettable powder. It was used at four strengths: .25, .50, 1.00 and 2.00 grams of the powder to 500 grams of air-dried soil placed in a five-inch flower pot. In one series of tests, it was used at the rate of 3 grams to 500 grams of soil. Its use at the rate of one gram of the 15 percent wettable powder over the soil surface of a five-inch flower pot, was estimated to equal approximately 106 pounds of technical parathion to each surface acre.

Graph No. 1



Graph No. 2



Insects involved in the tests, all of which were made under greenhouse growing conditions, included the black bean aphid (*Aphis rumicis* (Linn.)), on plants grown from nasturtium seed; third instar Mexican bean beetle larvae (*Epilachna verivestis* (Muls.)) and two-spotted spider mite (*Tetranychus bimaculatus* (Harvey)) on bean seedlings; melon aphid (*Aphis gossypii*) (Glov.)) on young squash plants; and the potato aphid (*Macrosiphum solanifolii* (Ashm.)) on potato plants.

The insects were placed on the seedling plants or on parts of them usually at two-week intervals, beginning two weeks after the seed was planted in the soil with which the parathion had been mixed. In one series of tests, however, the seeds were not planted until 3, 7 and 10 days after the parathion had been introduced into the soil. In the latter tests it was thought that some change of the parathion might take place in the interval

1. Department of Entomology, Cornell University.
2. Presented as a thesis to the faculty of the Graduate School of Cornell University by the senior author for the degree of Master of Science, Ithaca, New York.
3. Further information on this phase of parathion is available to technical personnel in American Cynamid Co., bulletin No. 2, pages 18-21.

by

MARY M. GRANGER
and R. W. LEIBY[1]

between its introduction into the soil and the planting of the seed, which might increase or decrease its toxicity against the insects placed on the seedlings later.

Insect toxicity tests were made by placing the insects on seedlings removed at the time from the pots to vials of water. These were then placed at constant room temperature of 25°C. In some instances they were placed on compound leaves of potatoes, or on bean leaves taken from different parts of the plants; and the infested leaves were then transferred to individual vials of water and placed in the controlled temperature room.

Each individual leaf or plant tested was hand-infested with ten adult wingless aphids, or ten adult mites, or ten third stage bean beetle larvae. The observations on mortality were made at 24 hour and at 48 hour periods after infestation over a period of eight to eleven weeks after the seed was planted.

To determine any retardation in the growth of the seedlings or plants due to the parathion in the soil, height measurements were taken at regular intervals and compared with those of similar plants grown in pots of soil not treated with parathion.

The results in table 1 indicate that parathion did not affect germination of the nasturtium seed adversely under conditions of these tests. Slight retardation of growth during the first two weeks after planting is indicated where parathion was used; but after that and up to eleven weeks, the plants grown in check pots were no higher nor any healthier than those grown in pots of soil containing parathion.

Tests on Black Bean Aphid

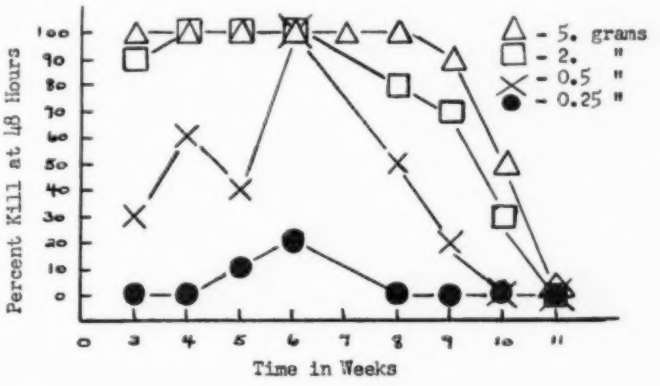
GRAPH no 1 indicates that where 2 grams of 15 percent wettable powder of parathion were placed in a five inch pot of soil, 100 percent kill of black bean aphids was procured from the second to the ninth week. Ten aphids were placed on the leaves of each of four replicated plants at weekly intervals, the examinations for toxicity being made at 24 and 48 hours after the aphids were placed on the seedlings. The toxicity decreased to zero between the 9th and 11th weeks. A lesser degree of toxicity is indicated where less parathion was used. The peak of toxicity in all cases was six weeks after the seed was planted.

When aphids were placed on seedlings left growing in pots of soil treated with parathion, the highest concentration of 2 grams per pot kept the seedlings almost free of aphids. Where only .25 gram was used per pot reproduction was maintained continuously.

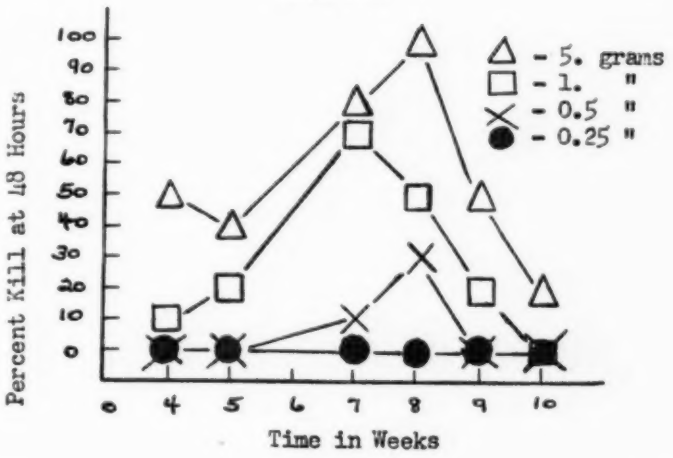
Table no. 2 indicates that the germination of bean seed was re-

(*Turn to page 79*)

Graph No. 3



Graph No. 4



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North Central Weed Conference

POLICY COMMITTEE *Report*

BASED on information accumulated in 1948 by the Research Committee of the North Central Weed Control Conference, the following report of the Policy Committee on Herbicides is presented. The writers emphasize that this report "can in no way replace State and local recommendations". It points out that the effectiveness of herbicides depends upon numerous factors which vary from region to region, and that the user should confer with the state agricultural experiment station for specific recommendations on the use of herbicides locally.

The policy report, made public following the recent meeting of the North Central group in Springfield, Illinois, is presented here in its entirety. Recommendations which suggest rates of applications of 2,4-D are in all cases based on the acid equivalent.

Control of Perennial Weeds

PERENNIAL weeds are difficult to control with 2,4-D. Best results have been obtained by treating during the active growing stage—generally near the bud stage. One application of 2,4-D seldom gives eradication. Retreatments are necessary. It is generally agreed that where eradication is the objective, higher rates of 2,4-D have given the best results. Where long time control under cropping conditions is the objective, the rate of application should be governed by the maximum amount the crop will tolerate.

CANADA THISTLE. To eliminate Canada thistle, repeated applications of 2,4-D over a period of several years are generally necessary. First application should be made at the bud stage with retreatments when the surviving thistle plants are in the rosette stage. One-half to one pound of 2,4-D per acre is suggested as a range of application.

PERENNIAL SOWTHISTLE. 2,4-D has given effective control of perennial sowthistle in cereal crops when applied at approximately one-half pound acid per acre. One and one-half pounds applied at the bud-flower stage has resulted in nearly complete eradication, especially when the weed is in competition with aggressive grasses. Repeated treatments are generally necessary to eliminate surviving plants.

WHITE TOP OR HOARY CRESS. Hoary cress may be effectively controlled by 2,4-D. Seed production is prevented, top growth stopped, and the stand reduced by one application at the bud to early bloom stage. Repeated treatments over a period of three or four years, have resulted in elimination of the weed in grass sod and on cultivated land in connection with cultivation and the growth of crops. Since hoary cress is moderately tolerant to 2,4-D the esters generally should be used. Treatments at rates of one and one-half to two and one-half pounds of acid per acre in early bloom and or fall rosette stages are recommended. These rates will injure most crops. Plants that emerge within 3 or 4 weeks after treatment should be spot treated to assure complete coverage.

FIELD BINDWEED. Field Bindweed is most susceptible to 2,4-D when just starting to bloom but may be controlled at other stages if growing vigorously. One-half to one pound of 2,4-D acid per acre is required to give practical control of this weed.

LEAFY SPURGE. 2,4-D is useful in controlling and sometimes in eradication of leafy spurge in growing crops, on summerfallow and on non-crop land. 2,4,5-T does not offer any advantage over 2,4-D in treatments of this weed.

2,4-D at low concentrations in oil appears to be more effective than when used in water.

In a growing grain crop the weed should be treated at any time prior to bloom stage with one-half pound of 2,4-D acid of the ester or amine salt.

For eradication purposes on summerfallow, use not less than ¾ pound of ester or amine salt when the weed is in the bud stage and repeat this treatment throughout the growing season whenever the top shoots are three to five inches high.

In eradication work, cultivate lightly the infested area wherever possible and seed it to the grass best adapted to the climatic and soil conditions of the region. After the grass stand is established, treat the weed when in the bud stage with an ester of 2,4-D at rates of one to two pounds of acid per acre.

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Control of Annual Weeds

2,4-D can be used to control many annual weeds. However, some are resistant. Annual weeds are more susceptible in the seedling and early stages of development, and when conditions are such as to promote vigorous growth. Some weeds which are resistant at later stages of growth are readily killed when young and actively growing. In some areas the ester formulations have been much more effective in controlling annual weeds than either the amine or sodium salt. 2,4,5-T appears to be no more effective than 2,4-D. Some weeds may be controlled with dosages as low as ⅛ pound of 2,4-D per acre. State experiment stations should be consulted concerning the susceptibility of specific weeds and the dosage necessary for control.

2,4-D in Growing Crops

FROM a rather limited amount of data it appears that recommendations concerning 2,4-D treatment of legumes seeded in other crops should include:

1. Unless some reduction in legume stand can be tolerated, 2,4-D should not be used.
2. If treatments are made, not more than ¼ pound of 2,4-D acid per acre in the amine and sodium salt formulation should be used. The companion crop must be approximately 20 inches tall.
3. There appears to be differential response in different species of legumes when treated with 2,4-D. Red clover appears to be more tolerant than alfalfa.

FLAX. Flax should be sprayed as soon as there is enough weed growth to make it practical. Flax is susceptible to reduced yield if sprayed in the bud or bloom stage.

The ester formulation should not be used on susceptible varieties. For tolerant varieties, the rate should be approximately one-half the amount of the amine salt recommended for the area.

Varieties differ most widely in their response to 2,4-D when the ester is used, when rates of amine or sodium salts are heavier than recommended, or when applications are made in bud and bloom stages.

SPRING PLANTED WHEAT, OATS AND BARLEY. A maximum amount of ¼ to ½ pound of 2,4-D acid per acre may be applied before the fully tillered stage and a maximum amount of ½ to ¾ pound may be applied after the fully tillered stage—except for the boot to dough stage—without appreciable reduction of yields and viability of the crop. Abnormal heads may be produced when treatments are applied at the earlier stages. The lower indicated rates should be used as the maximum amounts of the ester formulations.

FALL PLANTED WHEAT, OATS AND BARLEY. To get the most efficient use of 2,4-D for the control of annual weeds in winter wheat, oats and barley, it should be applied in the spring while weeds are small and before the crop has reached the boot stage. At this stage ¼ to 1/3 pound of ester or ½ to ¾ pound of salts of 2,4-D can be used without serious injury to winter cereals. Where heavy rates are required to control perennial weeds some injury to the crop can be expected. Winter wheat is more tolerant to 2,4-D when the application is made under low moisture conditions. There is evidence that winter barley is more tolerant to injury from 2,4-D than winter wheat.

GROWING CORN AND SORGHUM. 2,4-D has a place in the cornfield where susceptible weeds cannot be adequately controlled by conventional methods of cultivation. As cultivation is apparently essential on many soil types, spraying should not be considered as a substitute.

Some degree of injury to corn—including field, pop and sweet corn—from 2,4-D sprays, regardless of dosage, is to be expected as exhibited by brittleness, lodging, stalk curvature and proliferation of brace roots. Such damage may or may not be reflected in yields. Brittle corn is subject to breakage by wind or cultivator contact.

Differences in tolerance of strains and varieties of corn to 2,4-D exist. Information concerning tolerance of different locally adapted strains should be obtained from local agricultural experiment stations.

It appears that ¼ to ½ pound of 2,4-D acid per acre is the logical dosage to apply. It is suggested that the dosage be held to the lower figure when the ester types of 2,4-D are used. The dosage should be determined by amounts known to be necessary to control weeds up to the limits that corn will tolerate.

Time for application should be determined by weed growth. The ideal time to apply sprays is following emergence of the majority of weeds but before weeds have damaged the corn. Growing conditions at time of spraying, rather than size of corn determine susceptibility to injury. Greatest injury to corn results when 2,4-D is applied during periods of high temperatures and favorable moisture conditions for plant growth. When spraying small weeds in large corn (30 inches or larger) the use of nozzle extensions is suggested to assure adequate coverage of weeds that are often protected by corn leaves.

General recommendations for the use of 2,4-D in corn will apply to its use in sorghums. Only limited information relative to sorghums is available and local agricultural experiment stations recommendations should be closely observed in treating this crop.

PERENNIAL GRASSES. Established stands of most perennial grasses are so tolerant of 2,4-D that dosages used may be

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those necessary to control susceptible or semi-tolerant weeds. An exception should be made in the case of bent-grasses and buffalo grass. These grasses may be susceptible under some conditions.

Seedling grasses may be injured by 2,4-D applied at or immediately following emergence. Seedlings may be treated with ¼ or ½ pound acid per acre after reaching the 4-6 leaf stage of growth. As the grass seedling increases in size and age, dosages may be increased. After seedlings are well tillered and have 12 or more leaves they may be treated much as established plants and expected to tolerate dosages adequate to control broad-leaved weeds.

The use of 2,4-D for control of broad-leaved weeds in grass seedlings on lands heavily infested with seeds of weedy annual grasses is inadvisable. Such treatment is often followed by increased competition by the annual grass species which cannot be controlled with 2,4-D.

Preemergence Use of 2,4-D

CORN. Preemergence applications of 2,4-D are an *adjunct* to cultivation of corn, not a *complete* substitute on all soil types. Effective preemergence treatment of corn with 2,4-D is most effective when sufficient soil moisture is present to cause rapid weed seed germination. Applications of 2,4-D are most effective for control of weed seedlings when made from three days after planting up to the time of emergence. Where conditions are favorable, two pounds of 2,4-D per acre are sufficient. Results, however, have been variable, indicating a need for a continued and an intensified program of research.

Preemergence treatment of corn is recommended only when conditions are favorable, and where problems of weed control exist that cannot be solved by other means. It may have some advantages over postemergence spraying in the control of grass weed seedlings in rainy weather Preemergence treatments of corn with 2,4-D are not recommended on sandy or light porous soils.

OTHER FIELD CROPS. Preemergence application of chemicals for weed control in grain crops, flax, sorghum and miscellaneous field crops gave erratic and generally unsatisfactory results in the North Central region in 1948. The commercial use of this technique for weed control in these crops is not recommended in the area in 1949.

Horticultural Crops.

CHEMICAL weed control measures with horticultural crops should be thought of as only an *aid* to cultivation and not as a *substitute* for cultivation. With the exception of carrots and corn, a great deal more research is required before general suggestions for the use of herbicides in truck crops can be made.

In carrots light oils with an aromatic content of approximately 10-16% are suitable for the control of annual weeds and grasses.

2,4-D can be used in sweet corn but definite varietal differences in the tolerance to 2,4-D exist. State recommendations in regard to variety response should be followed. For postemergence use the maximum safe dosage is ¼ pound ester and ½ pound of salts. As preemergence treatments the results now available do not warrant general recommendations for the use of 2,4-D in sweet corn.

Preemergence treatments in asparagus, beans, beets, onions, spinach and melon crops have shown promise but no specific recommendations can be made. Pentachlorophenols, dinitrophenols, 2,4-D and aromatic oils offer considerable promise, but suitable rates and time of application have not been fully determined.

Postemergence usage of herbicides can be made in asparagus, onions and beets but the results that can be expected are dependent on a number of factors and state recommendations are essential. In asparagus cyanamid is safe for the control of young annual weeds. The use of 2,4-D in asparagus is a questionable procedure. Asparagus plants are not usually killed by ¼ to one pound acid equivalent per acre, but productivity of the beds may be reduced by repeated treatments.

Onions may be sprayed with sulfuric acid, cyanate or pentachlorophenate but climatic factors affect the results to such an extent that regional suggestions are not warranted. 2,4-D and dinitrophenols are not safe for use in beets. "TCA" should not be used in bean or pea crops.

The use of 2,4-D at one pound per acre for the control of annual weeds in strawberries appears to be satisfactory in a first year planting. In the second season, 2,4-D should not be used during the flowering and fruiting period. Spot treatment, with suitable chemicals, for the control of perennial weeds in any crop is recommended, even when such treatment will destroy the crop in the treated areas.

Potatoes, Sugar Beets, Etc.

BECAUSE of inadequate information; 2,4-D, oils, pentachlorophenol, dinitros, and "TCA" for weed control in potatoes, sugar beets and certain legumes cannot be recommended for field use. Results with 2,4-D, dinitros and pentachlorophenol on potatoes and on certain established legumes are promising and should receive further study.

Preemergence tests with dinitros, pentachlorophenate and pentachlorophenol in oil, and post emergence treating with sodium and potassium chloride and certain copper salts should be given further attention especially with sugar beets.

Sugar beets, potatoes and some legumes are especially sensitive to "TCA." Established legumes,

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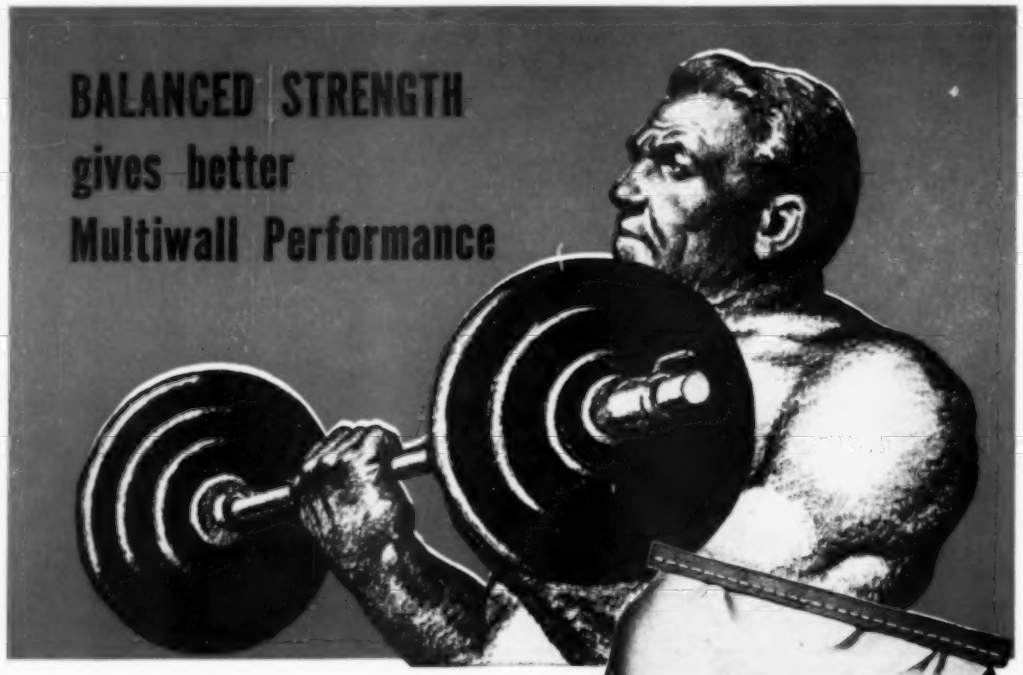

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The Listening Post

Reports of Fungicide Experiments

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

EDWARD K. VAUGHAN and B. F. Dana, reporting joint investigations conducted by the Oregon Agricultural Experiment Station and the U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering, give results of two experiments with various chemicals used as sprays and dusts for the control of white mold, caused by *Sclerotinia sclerotiorum*, in Oregon in 1948. This is a widespread soil-borne fungus that attacks numerous different kinds of plants. In the Pacific Northwest it has been considered as a disease of minor importance, but of late years intensive culture under irrigation of vegetables for processing has favored increase of the disease in such a crop as the Blue Lake type of pole beans.

Sprays and dusts have not been very effective in other sections, their failure being explained on the ground that most infections resulted from invasion of the plant from the soil by the fungus, which grew upward through the stem and hence could not be reached by fungicides on the surface of the plant. Crop rotation has been the standard control measure for this disease. However, a comparison of environmental factors with those in other sections suggested the trial of sprays and dusts in the Pacific Northwest.

During the 1948 season, two experiments were carried out, at Corvallis and Sugene, with the variety Regular Blue Lake. Only the Corvallis experiment is discussed here. Six materials—"Parzate", "Phygon", "Bioquin", bismuth subsalicylate, "Zerlate", and silver nitrate—were applied as sprays; and three—a copper-sulfur mixture, "Phygon", and "Parzate"—as dusts. Actively fruiting fungus materials were placed in each individual plot when the plants were about two feet high. In recording the data basal infections, where some part of the infected area was or could have been in contact with the soil, and aerial infections, where no part of the infected area was or could have been in contact with the soil were distinguished. Results as shown in Table 1 are of interest because of the degree of control of aerial infections following application of certain of the fungicides. Bismuth subsalicylate reduced the number of infections very markedly. Some materials gave lesser degrees of control, while others apparently injured the plants sufficiently to provide additional points for fungus invasion.

Control of basal infections was roughly parallel to the control of aerial infections. This fact is of particular interest since it indicates either that most of the infections occurring low on the plant are caused by germinating spores, or that they are caused by superficial growth of the fungus on the outside of the stems and are therefore subject to the action of fungicides. The very small number of basal infections in the plots sprayed with bismuth subsalicylate also indicates that the number of cases of direct infection by the fungus from the soil through the roots and stem was not great.

Insecticide on Scab

EDWIN GOULD and Carlton F. Taylor of the West Virginia Agricultural Experiment Station report tests with some insecticidal sprays in 1948. Results presented in Table 2 were obtained in an experiment in Berkeley County, consisting of two replicated 50-tree plots of each of 10 treatment schedules on vigorous 5-year-old Elberta trees. The data are the averages

Table 1.

Control of Sclerotinia sclerotiorum Infection in Blue Lake Beans by Sprays and Dusts, Corvallis, Oregon.

Materials Used	Mean Numbers of Centers of Infection per 30-ft. row (a) Aerial Infections	Basal Infections	Total Centers of Infection	Mean No. of Plants Killed by Fungus per 30-ft. row
Sprays				
"Parzate"	23.25	29.00	52.25	22.75
"Phygon"	27.25	37.00	64.25	35.25
"Bioquin"	12.75	15.00	27.75	11.25
Bismuth Subsalicylate	2.25	1.50	3.75	3.50
"Zerlate"	9.75	10.75	20.50	7.75
Silver Nitrate	25.00	27.50	52.50	27.25
Dusts				
Copper-sulphur	10.75	10.25	21.00	13.75
"Phygon"	14.50	24.00	38.50	28.50
"Parzate"	25.50	35.50	61.00	29.00
Untreated				
Check	20.25	21.00	41.25	24.50
Required for Significance at 5% level	12.63	14.35	25.52	13.28

(a) 4 replicates

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of all fruits from 10 trees in the center of each 5 x 10 tree plot. The spray dates were April 20 (petal-fall), April 26, May 10, and May 24. At the fourth application 8 pounds per 100 gallons of flotation sulfur was added to each series. One month after petal-fall is the usual recommendation for sulfur application for control of scab caused by the fungus *Cladosperium carpoplulum* in this section. In this experiment sulfur was not added until May 24, 39 days after the 1948 average petal-fall date of April 15. This delay in sulfur application permitted scab infection, as shown by the high percentages of

(*Turn to page* 85)

Table 2.

Effect of insecticides on the incidence of peach scab

Material and concentration, pounds per 100 gallons		Percent scabbed, based on total crop from 10 trees per plot		
		Replicate A	Replicate B	Weighted average *
1. Acid lead arsenate	2	0.1	5.5	2.6
Flake zinc sulfate	6			
Hydrated lime	8			
2. Benzene hexachloride (10% gamma isomer)	2	27.4	70.7	56.6
3. Chlordane, 40%	2½	19.3	79.3	53.4
4. Toxaphene, 40%	4	No fruit due to spray injury		
5. Parathion, 25%	½	37.2	18.5	31.8
6. Parathion, 25%	1	42.4	87.5	65.4
7. Benzene hexachloride	2			
DDT	2	37.1	70.70	56.6
8. Benzene hexachloride	2			
Parathion	½	32.0	81.9	62.1
9. Acid lead arsenate	2			
Flake zinc sulfate	6	0.5	7.3	5.4
Hydrated lime	8			
Parathion	½			
10. Acid lead arsenate	2			
Flake zinc sulfate	6	0.5	3.5	2.8
Hydrated lime	8			
DDT	2			

* The number of record peaches varied from 1288 to 2955 per treatment.

Predict Serious Grasshopper Infestation This Summer

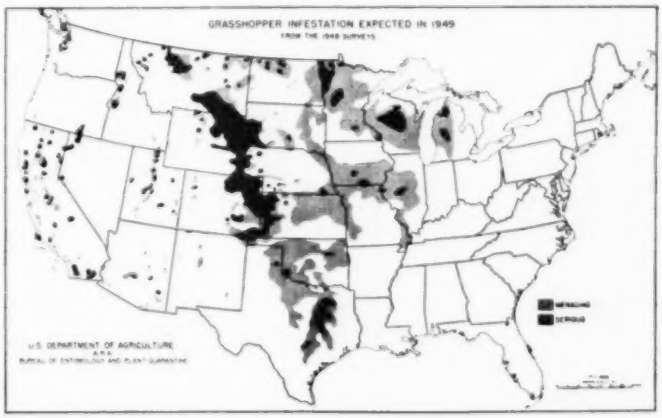
This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

SURVEYS recently completed by entomologists of the United States Department of Agriculture and cooperating agencies indicate that grasshopper outbreaks may occur this year in many localities from Michigan to California and from Texas to Canada. Especially severe infestations are likely to develop in eastern Montana, Wyoming, and Colorado, in western Nebraska and Kansas, and in Texas. Nearly every state west of the Mississippi River, except in the far Northwest, may experience outbreaks of less intensity. Unless weather conditions unfavorable to the 'hoppers occur during their hatching period in the spring or other natural control factors appreciably aid in reducing the anticipated populations, farmers in these areas will have to wage a concerted fight to save their crops and pastures from this pest.

A new publication entitled, "Grasshopper Control Improved by New Insecticides," contains the latest recommendations of the Bureau of Entomology and Plant Quarantine for the use of chlordane and toxaphene in sprays, dusts, and baits for the control of those pests. This publication supersedes EC-1, "New Insecticides for Grasshopper Control," issued a year ago. It points out that these new materials are particularly effective against the 'hoppers when applied as sprays or dusts on succulent growth along roadsides, railroad rights-of-way, canal banks, and field margins, or to such crops as rank-growing alfalfa, young cotton, or corn. Sprays containing chlordane or toxaphene give higher initial kills, and continue to kill 'hoppers over a longer period than dusts containing equal dosages. To give effective control, these insecticides must be

(*Turn to page* 67)


GRASSHOPPER INFESTATION EXPECTED IN 1949
FROM THE 1948 SURVEYS
U.S. DEPARTMENT OF AGRICULTURE
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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

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Government Purchases, Other Factors Affect PESTICIDE MARKET

by

Melvin Goldberg

Pesticide Advisory Service
37 Wall Street, New York

GOVERNMENT purchases of pesticide chemicals for foreign relief once more provide an indication of the price trend of these materials. It will be recalled that last month a purchase of technical DDT by Communicable Disease Center of the U. S. Public Health Service served as a bellwether for a weakening in the technical DDT market price.

During January a purchase of over a million pounds of technical DDT by the Department of the Army, and a purchase of over 600,000 lbs. of technical benzene hexachloride for the same agency showed again the weakening position in the market for these synthetic materials at this time. The technical DDT sold at an f.a.s. Atlantic or Gulf Coast port at 31½c lb., the material being packaged in 25 lb. steel drums. The technical benzene hexachloride on the other hand, having approximately 11% gamma content was sold to the Government at 15.3c lb., f.a.s. East Coast port.

On January 20th, the New York Quartermaster Depot purchased many materials for shipment to Korea which in themselves were insecticides or were raw materials to be used in the manufacture of insecticides in Korea. Pyrethrum, Rotenone, Copper Sulphate, 50% DDT Wettable Powder were among the items purchased. There were only three bidders on the Rotenone required; one producer bid on only part of these requirements. The low bid was approximately 27c, f.a.s. East Coast Port, which was a surprise in view of the short position. There were only two bidders on the ground pyrethrum flowers, one of whom bid only on a part of the requirements. The price on which this part of the bid was awarded was in line with current commercial quotations. The 50% wettable DDT powder ranged in price from 19c to 26c lb., f.a.s., for a quantity in excess of 300,000 lbs., while the copper sulphate was awarded at a price of $6.89 per cwt. for a quantity in excess of 1,300,000 lbs. involved.

Pyrethrum

THE market on pyrethrum has completely firmed up and practically all pyrethrum processors increased their prices as of the first of the year. The purified pyrethrin extract containing 20% pyrethrins is now selling at a price in the vicinity of $8 lb., whereas the former price was in the general vicinity of $7 to $7.25 lb. 20-1 extract is now in the vicinity of $6.60 per gal., whereas formerly it was in the general area of $5.50 to $5.75 gal.

Most of the activity in the pyrethrum picture at this time is for use of the material in the household and industrial field with particular emphasis on the low pressure aerosol method. However, many industry spokesmen feel that with the emphasis away from the synthetic organics, there will be a fair amount used in agriculture this year. While there has been an increase in the cost of pyrethrum, many spokesmen feel that the use of various synergists will aid appreciably in making this material a little more economical for use in agriculture.

Rotenone

THE supply position on rotenone continues to remain serious although most producers have announced prices for 5% rotenone powder in the general area of 28c lb. in carload lots. A considerable number of industry spokesmen continue to feel that there will be a definite shortage by April or May. In fact, the January-February 1949 issue of the A.I.F. news carries a warning advising rotenone users to cover at least for their minimum estimated requirements. The article points out that the supplies in the hands of American processors are limited, and only a short period remains in which it is possible to augment these supplies by additional imports in time for the consuming season. This was pointed out in this column both in November and December of 1948.

Parathion

PARATHION technical grade continues in tight supply at the present time, and no substantial

(*Turn to page* 65)

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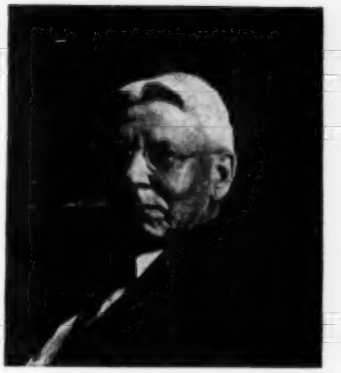

By Dr. Alvin J. Cox

This column by Dr. Cox appears as a regular feature of AGRICULTURAL CHEMICALS. Dr. Cox formerly was successively Physical Chemist, Chief Chemist, Assistant Director, and Director of the Bureau of Science, Government of the Philippines. He was appointed Chief, Bureau of Chemistry, California State Dept. Agriculture in 1932, retiring in 1945.

IT IS only natural that problems should arise out of the use of economic poisons, and such problems must be met by suitable measures on the part of the states. There must be laws adequate to prevent damage to property or injury to persons. The states of the west, like those of other portions of the U.S., have long ago established suitable control measures, and have kept abreast of changing conditions so that no new problem is allowed to get out of hand.

There is urgent need for more complete knowledge about each new insecticide and fungicide before it is offered to the public on a wide-scale basis. But even so, a certain amount of confusion seems inevitable on any new toxicant. In the minds of many, if a tolerance is established for a product, then that material is regarded by them as dangerous. If, on the other hand, no tolerance is established, there may be objections from some officials to the sale of the product. It seems obvious, therefore, that there should be a better method of handling the situation.

Information on most of the newer pesticides is widely scattered in numerous chemical, engineering, medical, entomological and other publications, so that without proper correlation, many persons are prone to approach the problem of safety from their own point of view. This of course makes for a certain amount of conflicting information, particularly when proper judgment is not exercised, or when prejudice for or against a particular product makes some persons ignore the facts. The needed entity appears to be a liaison committee which can correlate the available information and put it into practice through the cooperation of manufacturer, salesman and user.

Although some toxicants are naturally more dangerous than others, in a strict sense, there is nothing in the world which is entirely "safe" under all conditions. Common table salt is certainly not considered hazardous, yet, it is possible for one to eat enough to make it become injurious. In a similar way, it is impossible to publish warnings covering the possible hazard of every economic poison at every dilution on every crop. In the case of DDT, probably more research work went into it during the war, than had previously gone into any other pesticide in history. Yet there is still much to be learned about the material.

Knowing **all** of the facts is hardly possible, but accumulating data are usually sufficient for progressive action to be taken. When a set of facts has been determined and the toxicity of a certain agricultural spray or dust has been classified, there should be an announced understanding between industry and government representatives that toxicity hazards may no longer be anticipated in connection with spray or dust residues below certain levels. These tolerances, of course, may be revised as new information comes to light.

Labels on containers are often the medium through which the consumer is instructed on proper application and use. That these must be accurate and easily understood, goes without saying. Directions for use must be stated clearly, and precautions must be complete so that the consumer may not mishandle the material. Trouble can easily occur when hazardous materials are applied by persons inexperienced in the use of such toxicants. Unfortunately, many consumers fail to read labels, and because of this, actually do not know how potent the material they are handling may be. Carelessness may result in hazardous application which in turn often leads others to condemn the use of some desirable chemical preparations.

Food production in the past few seasons has attested to the value of economic poisons in the raising of abundant crops. These chemical products go further than merely aiding in production and helping to protect foodstuffs in storage. The benefits of these

(*Turn to page* 85)

Proved and Approved by users everywhere

Niatox (DDT) Dusts and Sprays
BHC Dusts and Sprays
DDT Technical Grade
Lead Arsenate **Calcium Arsenate**
Chlorkil (chlordane) Dusts and Sprays
Phoskil (parathion) Formulations
Hexamite (tetra ethyl pyrophosphate)
Kolo-sulphur Dusts and Sprays
C-O-C-S Dusts and Sprays
Niagara Stik (anti-drop spray)
Sulphur products
Orchard and Crop Dusters
Orchard and Crop Liqui-Dusters

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"When you buy Niagara, you buy protection" is the universal stamp of approval in the agricultural chemical field. It means what it says has been proved and approved by users from coast to coast.

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Cotton States Branch A.A.E.E. Meets

E. W. Dunnam New Chairman . . . W. C. Nettles Vice-Chairman . . . Joint Session at Baton Rouge with Assn. Southern Agricultural Workers and Southern Weed Control Conference.

THE Cotton States Branch of the American Association of Economic Entomologists met on the campus of Louisiana State University, Baton Rouge, January 31 and February 1 and 2, the meeting being held concurrently with the annual session of the Association of Southern Agricultural Workers. Both meetings were held under rather trying conditions as they followed only a day or two after the serious ice storm that had paralyzed transportation and telephone facilities over a wide area in the south.

Further, the joint meeting of the two groups imposed a serious strain on the inadequate Baton Rouge hotel facilities, with resultant inconvenience and difficulty in attending the sessions which were held on the university campus, several miles out of town. In this connection it is to be noted that the Cotton States Branch voted to continue its former policy of meeting jointly with the ASAW in the future, when their meeting plans coincide, only if "suitable arrangements" for such joint sessions can be made. This year's meeting of the Cotton States Branch was originally scheduled to be held in New Orleans.

The Cotton States Branch will hold its next meeting in December of this year, concurrently with the meeting of the national association at the Tampa Terrace, Tampa, Fla. By the time of this meeting, members may have a new name for the branch to be passed upon, as the executive committee was instructed at Baton Rouge to try to select a more appropriate name. Members of the new executive committee for 1949 include the retiring chairman, John T. Creighton, University of Florida, the newly elected chairman, E. W. Dunnam, in charge of cotton insect work for the U.S.D.A. at the Stoneville, Miss. station, the new vice-chairman, W. C. Nettles, extension entomologist at Clemson, S. C., and the secretary-treasurer, reelected, K. P. Ewing, Agricultural Research Association, BEPQ, Waco, Texas.

The talk of the retiring chairman of the branch, Dr. John T. Creighton, was a highlight of the opening session of the 23rd annual meeting. Titled "The Future of Southern Entomology" it emphasized that while the cotton States Branch has already rendered a great service to the profession of entomology in the south, it can fill an even more important and expanded role if it has wider support. All persons engaged in entomological activity in the area should be encouraged to take part in the association's activities, said Dr. Creighton, and they should "feel a distinct professional obligation to give of their time and energies in the interest of the overall advancement of entomology in the south."

Dr. Creighton pointed out forcefully that "insects constitute the greatest limiting factor to the economic and social progress of this region." Such insect pests as the cattle tick, the boll weevil, Mediterranean fruitfly, citrus blackfly, malaria-carrying mosquitoes, etc., might well have paralyzed the area if left unchecked. "It was the dynamic drive of southern entomologists which solved these problems," he said, "and thereby contributed to the stability and advancement of the south."

Special attention was called to the important role of research in the future of entomological work. "It behooves us to encourage the continuation and expansion of all worthwhile research projects," he counseled. "We should especially encourage industrial organizations to appropriate a percentage of their profits from this region for worthy investigational work. . . . The strong progressive evolution of our science and its contribution to regional advancement will be determined by well rounded investigational programs, which include taxonomy, biology, ecology, and biological and natural control. There is a great deal of evidence that we are launched into a chemical control era in which many fundamental studies are being sorely neglected.

"The question of when to release research information becomes more complicated daily. This is especially true in the chemical control field.

"During World War II there was a justified demand for research releases based upon experiments of short duration. The war ended approximately four years ago, and there is no legiti-

mate reason for a continuation of this practice. Such releases based upon limited research data may endanger the entire entomological research structure.

"It is to be hoped that there are no recognized entomologists who have fallen victim of the publicity virus. If there are such individuals they should be discouraged in such activities.

"It is true that many industrial organizations desire all available information in order that they may market their products. However, we must constantly stress the fact that distribution of insecticides not based upon sufficient research investigations of top caliber may eventually jeopardize the successful use of such materials."

Gaines Speaks

REPORTS of experimental work with some of the new organic insecticides in the control of pests on cotton figured prominently in the paper reading program. Among these papers one by J. C. Gaines of Texas A. & M. entitled "Effect of Temperature and Humidity on the Toxicity of Certain Insecticides" attracted particular attention. Wide variations in temperature and humidity during application of insecticides for control of boll weevil produced the least diminution in effectiveness of calcium arsenate, Dr. Gaines reported. Of the organics, toxaphene suffered least loss of effectiveness under such conditions, a 20% toxaphene dust testing a little better than a 3% gamma BHC—5% DDT mixture. Results with a 10% chlordane — sulfur mixture were not favorable under the adverse temperature and humidity conditions.

Floyd Bondy of Florence, S. Carolina, gave another paper, of which R. L. Walker and L. C. Fife were co-authors, "Residual Properties of Several Chlorinated Hydrocarbons Against the Boll Weevil" which offered some interesting new data on comparative effectiveness of the new organics. Initial knockdown of weevils with the 3-5% BHC-DDT mixture was of course high. After 16 to 24 hours, however, toxaphene was found to be killing an equal number of weevils, and at the end of 12 days toxaphene showed continuing residual toxicity, giving kills higher than for any other product tested. It was of particular interest, Mr. Bondy indicated, that the BHC-DDT combination showed at least some residual effect even after twelve days. Previous opinion had been that it would lose its effectiveness rapidly after a comparatively short period of high initial effectiveness.

Another cotton paper, delivered by S. L. Calhoun and co-authored by W. R. Smith, Bureau of Entomology & Plant Quarantine, Stoneville, Miss., gave first reports on results with liquid sprays. It was entitled "Preliminary Experiments on the Control of the Boll Weevil, Boll Worm and Cotton Aphid with Organic Insecticide Sprays." Good control of all three pests was obtained with the sprays when applied from the air, applying in liquid form the same amount of insecticide content as would normally be used in a dust for effective control. Application of sprays with ground equipment did not give the same effective results.

Among those attending the meeting was Dr. A. M. Boyce, University of California, Riverside, president of the American Association of Economic Entomologists, who spoke briefly. Dr. E. N. Cory, AAEE secretary, was also on hand.

E. R. Sasscer, in charge, Division of Plant Quarantines, BEPQ, Washington, gave an interesting talk in describing the variety of problems faced in carrying out the work of his division, and protecting the country against invasion by plant pests from abroad. Junked war material being shipped back to the United States from various tropical islands, currently offers a particular problem, he indicated, a giant snail having been found infesting numerous shipments from the south seas. He mentioned the resumption of imports of Japanese lily bulbs as another current situation giving the Plant Quarantine Division a considerable problem. Airborne insect invasions present a more serious threat every year, Mr. Sasscer said, as more traffic comes into the U. S. by airplane. One out of every four planes has been found to carry prohibited material, Mr. Sasscer reported.

Insecticide Forum

A FEATURE of the morning session on February 2nd, closing day of the meeting, was the customary open forum for an informal discussion of new insecticides and their performance, in which representatives of commercial firms took the leading part. Dr. C. C. Compton of Julius Hyman & Co., Denver, opened the discussion with a paper describing two new Hyman toxicants, #118 and #497, which are now available in small quantities for experimental work. They have shown up rather well in tests against house flies, roaches and grasshoppers, comparing favorably in their effectiveness with DDT, chlordane and BHC. The former is volatile, while #497 is comparatively non-volatile. They are more toxic than some of the other organics, but as they can be used in smaller dosages because of their higher effectiveness, this added toxicity will not be a serious handicap, he pointed out.

Dr. J. L. Horsfall of American Cyanamid Co., New York, indicated that his company now has a new bulletin on parathion available for distribution. It gives data on kills, residues, toxicity hazards, and compatibility with other

insecticide materials. Recent work, he reported, shows that parathion volatilizes off surfaces on which it has been sprayed, and this action coupled with weathering serves to counteract the toxicity hazard. He emphasized, however, that there are numerous uses for which parathion is not yet being recommended, at least until further tests on toxicity hazards have been completed.

Dr. J. G. Sanders of Commercial Solvents Corp., New York, reported that his company expects to have several new insecticide materials ready for testing later this year. He reported on successful use of a 1% concentration of gamma BHC in vanishing cream for control of crabies and lice in humans.

Dr. E. N. Woodbury of Hercules Powder Co., Wilmington, reported that his company has surrendered its trademark rights in the name "Toxaphene" and toxaphene is now a generic term for insecticide chemical chlorine camphene, 67%-69% chlorine.

Dr. J. E. Bussart of Velsicol Corp., Chicago, reported the introduction of "Velsicol 104" which he said early tests have shown to be from two to five times more toxic to some insects than chlordane. A circular on the new product will be ready for release soon, he said.

Chlordane Spelling

IN a floor discussion of the spelling of the word chlordane it was indicated by various speakers that while the American Chemical Society prefers the spelling, chlordan, and the *Journal of Economic Entomology* has apparently adopted this form, the trade in general continues to use chlordane.

The local committee on arrangements for the meeting was headed by I. J. Becnel and C. E. Smith as co-chairmen. K. L. Cockerham and A. L. Dugas assisted.

Southern Weed Conference

THE Southern Weed Control Conference was held in connection with the A.S.A.W. and Cotton States Branch of the A.A.E.E. at Baton Rouge. Nearly 200 persons attended this portion of the meeting to hear some 37 papers covering a wide variety of herbicide problems as related to southern conditions. Results of experiments reported at the conference, point to extensive use of chemicals in the control of Johnson grass in sugar cane and chemical control of weeds in cotton, corn, rice and peanuts.

Officers of the Southern Weed Conference were named as follows: President, Dr. E. C. Tullis, U.S.D.A., Beaumont, Texas, to succeed Dr. Clair A. Brown, La. State University; vice-president, Dr. W. B. Albert, Clemson College, Clemson, S.C., to succeed Dr. O. A. Leonard, Mississippi State College; secretary, Dr. O. E. Sell, Georgia Agricultural Experiment Station, Experiment, Ga., to succeed Glenn C. Klingman, North Carolina State College.

The first day's session, Monday, January 31, held jointly with the Southeast Section of the American Society of Agricultural Engineers, was opened with an address by Dr. Harold W. Stoke, president of Louisiana State University.

Louisiana state laws regulating the application of herbicides were explained by W. E. Anderson, Louisiana Commissioner of Agriculture, Baton Rouge. He pointed out the severe losses suffered by cotton growers from the careless use of 2,4-D during past seasons, and indicated that prohibitory laws were brought into being to protect all farmers from irresponsible use of powerful chemicals.

Edgar C. Tullis, U.S.D.A., Beaumont, Texas, told of tests made to measure the drift of herbicidal sprays applied by airplane, in order to offer data to custom operators who must judge the course of their herbicidal spray material. Other topics discussed by subsequent speakers included the eradication of emergent aquatic vegetation with 2,4-D; the relation of alligator weed to wildlife and fisheries; and the control of mesquite.

The next morning's program, with J. B. Edmond, Mississippi State College presiding, included more papers on various problems of weed control. A progress report of soil treatments with 2,4-D was presented by L. L. Danielson of the Virginia Truck Experiment Station; the use of 2,4-D as a pre-emergence treatment with vegetables, by J. M. Jenkins, Jr., Wilmington, N.C.; and the general topic of pre-emergence control of weeds by O. A. Leonard, Mississippi Agricultural Experiment Station.

A. J. Loustalot, U.S. Department of Agriculture station in Puerto Rico presided at the Tuesday afternoon session, which saw a continuation of paper reading. A business session in the evening concluded the day's official activities. President Clair A. Brown was in charge of the evening meeting.

A joint meeting with the Agronomy section was held on Wednesday morning, with H. T. Rogers, Alabama Agricultural Experiment Station, in charge.

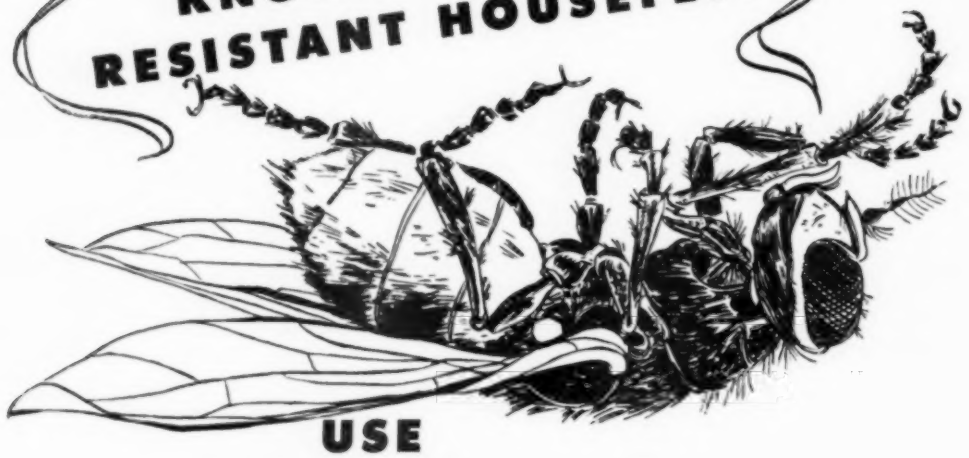
The exhibit of weed control chemicals and application equipment in the L.S.U. Agricultural Center attracted the attention of many of the visitors. Numerous manufacturers and distributors of both chemical and mechanical products were on hand to display their goods.

ASAW Meeting

THE Association of Southern Agricultural Workers held its annual meeting on the campus of Louisiana State University, Baton Rouge, January 31 and Feb-

(*Turn to page* 53)

KNOCK OUT THE RESISTANT HOUSEFLY!



USE *Chlordane* IN YOUR FORMULATIONS

Guard against failure in your market areas this year by incorporating CHLORDANE into your fly sprays. According to reports and probabilities, your fly spray formulations will require a powerful new toxicant to kill flies in '49. That toxicant is CHLORDANE. It has been proven effective in the field in this country and abroad, where flies have developed resistance to DDT.

Reports from 25 states indicate an increasing number of houseflies showing DDT-resistance. In parts of Italy, where DDT was used extensively for two full years before it was offered to the American public, this failure to completely eliminate flies after a few years of use is especially significant.

Professor A. M. Missiroli, Director of the Laboratory of Malariology and Parasitology, Rome, reports: "Two years ago DDT killed all flies, last year killed some, and this year, also with DDT applications, there are plenty of flies. On a farm, Octa-Klor (Chlordane) has been used in the barn and not in the house, which is just beside it. Flies disappeared from the barn and also from the house, which before was full of them.

Wherever houseflies are encountered—in the barn, on dairy cattle, in homes and institutions—CHLORDANE gives complete control.

Chlordane-DDT COMBINATION

For those formulators interested in obtaining all possible benefits of DDT, in areas where fly-resistance to this toxicant has not been evidenced, we suggest the CHLORDANE-DDT combination for the ultimate in fly control insurance. Write for formulating instructions for CHLORDANE fly-killing sprays, or for sprays in which DDT and CHLORDANE are combined.

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Technical Briefs

Pear Blotch Control

Use of dinitro sprays at the greentip stage of pear development followed by a summer application of "Fermate" when the disease threatens later in the season has given satisfactory control of the sooty blotch of pears.

With the development of the dinitro sprays for pear psylla, it was discovered in tests made by Dr. H. Palmiter, at Poughkeepsie, N. Y., that by increasing the concentration of the dinitro material, improved control of sooty blotch was obtained. In general, 4 quarts of the liquid dinitro or 4 pounds of the powdered form in 100 gallons of water applied just as the buds begin to show green at the tips will give effective control. Under ordinary conditions, no further spraying is required for sooty blotch where this early spray is applied thoroughly. In seasons that were specially favorable for the development of the disease, it was found advisable to make one or more summer applications of sulfur or "Fermate" to keep the pear crop free from blotch. The summer sprays were applied in late June and July.

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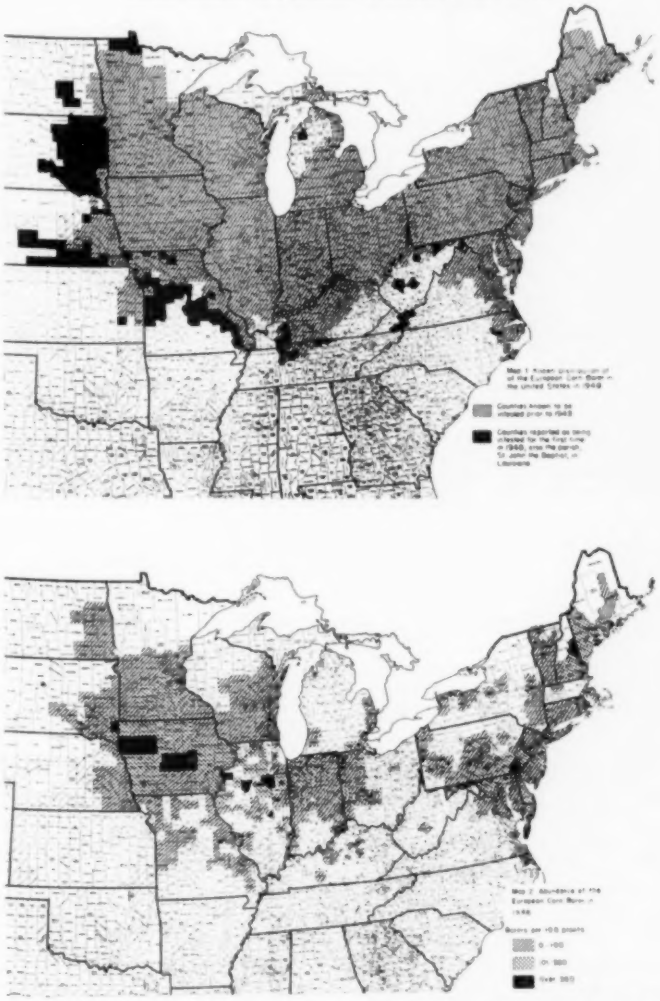
Elm Disease Control

Experiments carried on in 1948 to check Dutch elm disease by controlling the elm bark beetle, a carrier of the disease, appear to have been highly successful, Dr. George H. Plumb, entomologist at the Connecticut Agricultural Experiment Station, announced at a recent meeting of the Connecticut Tree Protective Association at New Haven, Conn.

About 200 large elm trees, apparently free of Dutch elm disease, were used in the experiment. Last Spring, half of these received applications of highly concentrated DDT solution delivered by mist blower; another 100 in adjacent plots were untreated. Examination of the trees late in the summer showed that only four trees in the DDT-treated plots had become infected while 21 trees in the plots which received no treatment had definite symptoms of the disease and six more seemed probably infected.

All treated trees received DDT applications of either 1 or ½ pound per gallon concentration in the spring before the first brood of bark beetles emerged to feed on elm twigs. The average dosage per tree was 4.2 gallons.

Corn Borer Expands Territory in 1948



How the European corn borer increased its foothold in the corn belt in 1948 is clearly seen in the U.S.D.A. maps above. In both area covered and abundance, the borer made rather startling gains. The U.S.D.A. places the damage caused by this pest at 85,500,000 bushels of corn worth about $103,000,000. Heaviest losses were suffered by Iowa farmers. (See Dr. Haeussler's "Listening Post" article, page 45).

Air Blast Fungicide Application

DRS. John B. Rowell and F. L. Howard, Rhode Island Agricultural Experiment Station, Kingston, have recently reported on the development of fungicidal concentrates and their application with motorized air-blast equipment to row crops.

Employed in the experiments was a Bean-Cooley "Portomist" skid-mounted air-blast machine. The unit had attached a demountable 4-row boom equipped with four air nozzles 3 feet apart over which were mounted four atomizing nozzles which discharge the concentrate as a flat fan into the air blast. The height of the boom was adjustable to the growth of the plants, and the direction of the nozzles was also adjustable. The air blast was directed downwards at a 45° angle towards the rear of the tractor which was pulling the machine.

Following completion of the experiments, it was concluded that four fundamental requirements must be fulfilled by the velocity and volume of an air stream as a carrier for fungicidal concentrates to control plant disease. These requirements are:

1. Volume sufficient to replace air in plant zone.
2. Velocity sufficient to agitate and expose all leaf surface to the "mist."
3. Velocity sufficient to be unaffected by surface winds under normal conditions.
4. Volume and velocity must not be of such magnitude as to injure the succulent tissue at close range.

Other conclusions drawn from the experiments included the observation that the distribution pattern of the mist was improved by the fish-tail nozzles used on the 1948 air-blast machine. Their wider angle spread the air "fan" 3 feet at approximately 2 feet from the orifice, thereby bettering row-to-row coverage. The atomizing nozzles must be placed so as to fill uniformly this air "fan" with "mist."

Coverage of lower surfaces, as measured by spore germination tests of residues on field-exposed slides, was inadequate for optimum performance of fungicides and contact insecticides.

Micronization of the fungicidal concentrate is required for the application in an oil solution of toxicants to row crops without injury. The largest droplets that can safely be applied would probably have to be less than 30 microns in diameter. None of the tested methods for producing mists have completely fulfilled this requirement. Fungicide-in-oil-water emulsions are not limited by droplet size and are more practical with the above equipment. Larger gallonage, however, will probably be required for adequate coverage of the plant surfaces by the coarser droplets.

Low-pressure, low-volume nozzles are satisfactory only for true solutions or emulsions. Fungicide-in-oil solutions are too phytotoxic to warrant safe application to row crops with existing air blast equipment, and none of these materials are class "A" fungicides. Development of improved water- or oil-soluble fungicides is necessary.

Droplet evaporation in transit during the application of aqueous fungicidal concentrates by mist blower prevents a visible deposit from reaching the plant on dry days. Various water-soluble, hygroscopic adjuvants should be screened to find a material to maintain the bulk of droplets. Water-soluble materials also require a weather-resistant, film-washing of the fungicide. Fungicide-in-oil-water emulsions fulfill these 2 requirements. Various ratios of the 3 components, however, should be studied under controlled humidity to determine optimum deposit characteristics.

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2,4-D in Grain

Remarkable crop increases resulting in 1948 from use of 2,4-D to control weeds in wheat, barley and flax fields, are being reported to farmers in Minnesota, the Dakotas and Montana in a series of meetings sponsored by Farmers Union Central Exchange of South St. Paul, Minn. In December alone 22 such meetings were held and others are being planned throughout the winter, it was announced by Art Wolcott, technical fieldman for the co-op.

A survey of last season's results from use of the weed killer, Wolcott said, shows the average increase in yield was 5 to 6 bushels per acre, while many treated fields have outyielded untreated fields by 25 per cent. The grain has been cleaner, he added, and dockage for weed seeds has been reduced from 7 to 1 percent. Harvesting has also been easier because troublesome weeds were eliminated from standing grain.

Wolcott told of one farmer at Eckelson, N. D., who treated barley fields for control of mustard and creeping jenny. On untreated fields yield was 5 bushels per acre and on fields treated with amine salt of 2,4-D it was 21 bushels, this farmer reported.

Another farmer treated 80 acres of flax with the amine salt of 2,4-D to control cockle burr. Sprayed areas yielded 11 bushels per acre, while untreated fields were not worth harvesting.

At Big Sandy, Mont., 1,300 acres of winter wheat were treated with the amine salt and one field, which in previous years was so foul with weeds that it was not worth harvesting, yielded 21 bushels after spraying last season.

Suppliers' Bulletins

Dow Folders Available

Dow Chemical Co., Midland, Mich., has recently issued booklets describing weed killers produced by the company. One folder, entitled "Weed Control Digest", tells when and how to control weeds easily and economically. The brochure is in full color with numerous illustrations. It opens out into a 22 x 25 broadside which is a chart instructing the user on what herbicide to use on certain weeds in various crops. It gives the name of the Dow weed killer, the amount per acre, the time to use the material, and particular instructions and warnings regarding application.

The other folder deals with chemical weed control on power lines, railway rights of way, highways and pipelines. It presents a number of full color photographs showing the use of chemical herbicides with power machinery, and gives instructions on how to use the materials safely and efficiently. Both booklets are available from the Dow Chemical Co., Midland, Mich.

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Pennsalt Folders Offered

Pennsylvania Salt Mfg. Co., Philadelphia, has announced a new series of six leaflets on its products for the dairy and allied industries. The folders include information on various cleansers for milk containers and other utensils used in dairy production.

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Atlas Technical Brochure

Atlas Powder Company has recently published a 75 page technical brochure on its emulsifiers and other surface-active agents. The book presents an exposition of a comparatively simple method of selecting emulsifiers for given application. The system is called the "Atlas HLB (hydrophile-lipophile balance). It is based on empirical "HLB" numbers representing balance between hydrophilic and lipophilic (water-loving and oil-loving, respectively) portions of the emulsifier molecule. Because of the technical nature of the book, it is of greater interest to technical educational institutions, research laboratories, etc. It is available from the Atlas Powder Co. offices, Wilmington 99, Del.

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Grasshopper Book Offered

Hercules Powder Co., Wilmington, Del., has published a booklet of photos of grasshoppers which have contacted toxaphene. The pictures were taken by Dr. Roman Vishniac, a photographer-entomologist, who uses special long-range telescopic lenses to catch various insects in different situations. The book was published for its general interest rather than to represent a scientific study of the effect of toxaphene on grasshoppers. Copies are available from the "Toxaphene News Digest" editorial office, Room 923, Delaware Trust Bldg., Wilmington 99, Del.

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Orbis Catalog Offered

An illustrated catalog—"Insecticides — Raw Materials and Uses" has been issued by the Insecticide Division of Orbis Products Corp., 215 Pearl Street, New York. The booklet is available upon request.

Describing insecticide raw materials sold under the trade name, "Orbiscide," the catalog covers the company's products for the insecticide industry. Orbiscides, it is explained, are for manufacturing use only and need further processing and packaging before reaching the consumer.

In addition to a line of DDT and Pyrethrum products, the catalog describes also a number of Rotenone products. Particularly descriptive is the section on Rotenone Resins which the company extracts from rotenone-bearing roots with suitable solvents. Information on crop-destroying insects is included, as well as the latest information on Cattle Grub Control as recommended by the USDA.

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Cotton Insect Pamphlet

A widely-distributed plan for education of cotton growers has been carried out by the Texas Cottonseed Crushers' Association, Dallas, Tex. One leaflet which has been distributed through the State of Texas through teachers of Vocational agriculture and Veteran's education, County Agents, soil conservation leaders, insecticide manufacturers and dealers, bankers and others, urges the grower to make every effort to control cotton insects early. In heavy capital letters, with cartoons of various insect pests of cotton, are the words "Kill 'em before they get started!" Accompanying the suggestion are several paragraphs of instructions on effective application methods, and information on proper timing.

The pamphlet concludes by stating that "early season control is the most economical and profitable to the producer. Bugs attack and continue to do damage whether it is cool, hot, wet, or dry. If insects are allowed to start damage before action is taken, control is more difficult and costly, to say nothing of the cotton lost. Weather conditions may be such that early season insect damage cannot be overcome without serious loss in yield." Copies of the pamphlet are available from the T.C.C.A., 624 Wilson Building, Dallas 1, Texas.

YOU ASKED FOR IT-HERE IT IS

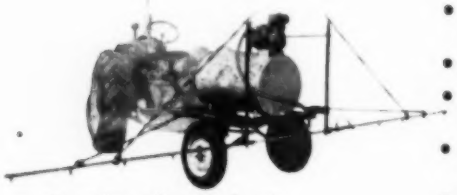
50 gallon self-contained unit with 22 foot Resisto-Rust superior boom — stainless steel with cadmium and galvanized parts. Mounted on our mono-wheel trailer.

We asked hundreds of agricultural chemical and equipment dealers what their customers expected in their new spraying equipment — what they liked and didn't like about equipment in general. The exclusive features in Howard Hanson spraying equipment deliver just the kind of improved performance and extra service you dealers asked for. Hanson sprayers and booms are engineered to sell so it will benefit dealers to carefully examine the outstanding features built into our equipment.

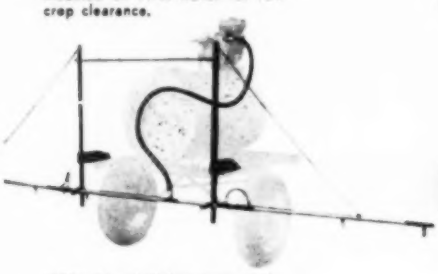
YOU ASKED FOR THESE FEATURES — HERE THEY ARE!

- A self-contained sprayer pump and tank unit.
- A power take-off unit.
- Units capable of highest pressures.
- Units with large capacity.
- 50, 100 and 200 gallon capacity tanks.
- Completely galvanized tanks — no rust problem.
- Tanks are round in shape.
- Pump and motor are mounted on top of tank.
- Solution is kept in constant agitation.
- Pump and tank unit quickly demountable from trailer.
- Booms are rigid construction — no sway trouble or wobble.
- Booms swing both ways.
- Booms are completely adjustable for any spraying job.
- Row crop attachments — easily fastened to regular boom.
- Special boom for wheat spraying.

For further information write direct to Howard Hanson & Co., Beloit, Wis.



100 gallon self-contained unit mounted on Hi-X trailer for row crop clearance.



Utility 15 and 22 foot boom in the very low price bracket but value through and through. Can be mounted on almost any vehicle.

THERE'S A HANSON AGRICULTURAL CHEMICAL TO FIT EVERY INSECT OR WEED CONTROL PROBLEM

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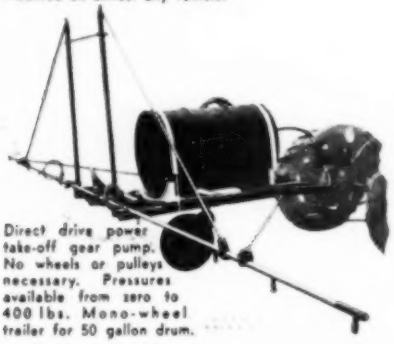
FOREMOST IN COMBINED CHEMICALS AND EQUIPMENT FOR AGRICULTURE



Direct drive power take-off gear pump. No wheels or pulleys necessary. Pressures available from zero to 400 lbs. Mono-wheel trailer for 50 gallon drum.

200 gallon self-contained unit with 35 foot Resisto-Rust sulky boom.

INDUSTRY NEWS

Grady Becomes Calspray VP

California Spray-Chemical Corp., Richmond, Calif., has announced the appointment of Howard J. Grady, vice-president. Mr.

H. J. GRADY

Grady will have headquarters in Washington, D. C., and will be in charge of all marketing activities of the corporation, east of the Rocky Mountains.

The new vice-president joined Calspray in 1926 as a research entomologist. In the intervening 22 years, Mr. Grady has served the company in a number of eastern locations, and has traveled throughout the world in the interests of Calspray. He went to Europe in 1931 and spent the following nine years in sales, research and plant operation in Western Europe, the Mediterranean area and North Africa.

Later, he became a District Manager in the U. S., establishing the "Ortho" line of products in the states of Washington, Oregon, Idaho, Montana and the Dominion of British Columbia. In 1947 he was made assistant manager of marketing at Richmond, and last year became Eastern Manager of Marketing with headquarters in Washington, D.C.

MEETINGS

South Dakota State Weed & Livestock Pest Control Conference. March 15 & 16, Aberdeen, S. D.

Southern Shade Tree Conference. Thomas Hotel, Gainesville, Fla., March 23-25, 1949.

N. Central States Branch, A.A.E.E., Hotel Schroeder, Milwaukee, Wisconsin, March 24-25.

2nd. Annual Texas Weed Conference, Amarillo, Tex., April 21, 1949.

National Agricultural Chemicals Association (AIFA), Annual Spring meeting, Westchester Biltmore Hotel, Rye, N. Y., April, 1949.

National Fertilizer Association, Greenbrier Hotel, White Sulphur Springs, W. Va., June 13-15.

American Plant Food Council, Hotel Mt. Washington, Bretton Woods, N. H., June 19-22, 1949.

Toxaphene Chosen

The word "toxaphene" has been accepted as a coined common name for the insecticidal chemical known as chlorinated camphene, having a chlorine content of 67 to 69 percent. The announcement was made by Dr. S. A. Rohwer, chairman of the Interdepartmental Committee on Pest Control.

It was pointed out by the committee that acceptance of toxaphene as a coined name for this material has been possible through the cooperation of Hercules Powder Co., Wilmington, Del., in relinquishing its trademarked name, "Toxaphene". The Hercules company has taken the legal action necessary to surrender the trade-mark name.

In reviewing the complicated procedure which led up to the acceptance of the name, the committee states that the action was taken through the cooperation of and after consultation with various commitees, associations, representatives of the Trade-Mark Division of the U.S. Patent office, etc.

Those participating in the acceptance of toxaphene as a common name, and concurring in its suitability, include *Chemical Abstracts* of the American Chemical Society; Council on Pharmacy and Chemistry of the American Medical Association; Committee on Insecticide Terminology of the American Association of Economic Entomologists; the National Association of Economic Poisons Control Officials; representatives of the Insecticide Division of the Production and Marketing Administration the Food and Drug Administration; the Public Health Service; and the Bureau of Entomology and Plant Quarantine, U.S.D.A.

•

Chas. King Joins Geigy

Geigy Co., Inc., New York, has announced the appointment of Charles A. King, Jr., entomologist, to its staff in the Dallas, Texas, branch. Mr. King will work under the direction of E. L. Jarrett, Dallas branch manager.

The new appointee is a graduate of Texas A & M College with the class of 1932, and served as assistant county agent of Lubbock County and as agent of Star County, Texas. He was a member of the armed services during World War II and was discharged with the rank of Lt. Colonel in 1945.

•

NACA in April Meeting

The usual Spring Meeting of the National Agricultural Chemicals Association (AIFA) will be held at the Westchester Biltmore, Rye, N. Y., in the latter part of April, it was announced just before press time. The exact dates will be decided upon later. The NACA (AIFA) expects to be located in its offices in the Barr Building, 910 17th St., N.W., Washington, D. C. by the first of March.

Custom Sprayers Meet at Univ. of Illinois

Photo courtesy Illinois Natural History Survey

Photo: (left to right) H. B. Petty, in charge of the Illinois short course; J. H. Hilgenbrink, George Keller & Sons, Quincy, Ill.; Walton Smith, Riverdale Chemical Co., Harvey, Ill.; Dr. George C. Decker, Illinois Natural History Survey entomologist; and William Omg, aircraft manufacturer, Kansas City, Mo.

SEPARATE organizations for ground and airplane custom spray operators were formed at the first commercial spray operators' short course held at the University of Illinois, Urbana, January 12-15. Earl Davies, Gardner, Ill., was named chairman of the newly-formed Illinois Commercial Ground Spray Operators' association, and Virgil Helgen, Decatur, Ill., was elected president of the airplane operators' group. Secretaries for the two groups are Robert Kirkpatrick, Princeton, Ill., for the ground sprayers, and Don Brummet, Vandalia, Ill., for the airplane group. A later meeting of the organization leaders is scheduled to draw up a constitution and by-laws for the association.

Nearly 300 persons attended the Urbana meeting which attracted persons from ten states and the Dominion of Canada. Problems of weed control were discussed, as were various insecticides and spray equipment including nozzles, rates of application, and spray schedules.

The short course was sponsored jointly by the University of Illinois College of Agriculture, the University's Institute of Aeronautics and the State Natural History Survey. H. B. Petty, entomologist at the University, was in charge of the short course.

•

Heavy Damage by Borer

Loss of 85,500,000 bushels of field corn valued at $103,000,000 was charged to the European corn borer in 1948, the U.S.D.A. has announced. This figure is more than double the loss counted in 1947.

The maps appearing on Page 50E show the distribution of corn borer in the U. S., and also the extent of infestation. Heaviest losers of corn were Iowa farmers whose losses totaled nearly $46,000,000. Illinois lost $26,000,000, Minnesota $8,000,000, Indiana $7,000,000 and Ohio $5,000,000.

The U.S.D.A. points out that the borer now infests the entire corn belt. The insect may be found in nearly every corn field from New England to the Dakotas and from Virginia to Canada. Some borers were found in the parish of St. John the Baptist in Louisiana, which indicates that the pest has moved farther south than had been known previously. Extensive surveys have not been made in the southern states, so it is not known whether or not the borer occurs in Arkansas, Mississippi, Alabama or Georgia corn fields.

U. S. D. A. entomologists state that peak damage from corn borer has not yet been reached. This will probably come in years favoring the development of the insect when it is generally distributed throughout the States, they say.

•

New Phosphate Fields

New regulations covering exploration, development and production of phosphate deposits in Western public lands were approved by the Department of Interior late in January. Under the new arrangement, fertilizer output in the west and midwest may be increased to a considerable extent.

Development of the phosphate deposits will be in the hands of private companies, according to the Department. The Government will receive rental and royalties on production, through two types of leases: "competitive" and "non-competitive."

The former type of lease will cover the development and production of minerals on areas already known to contain commercial phosphate deposits. The "non-competitive" lease will promote the exploration and discovery of commercial phosphate deposits in unexplored areas of the public land.

Assistant Secretary of Interior C. Girard Davidson pointed out the west's need for a source of supply nearer than present ones, and added that the new regulations may be regarded later as a "landmark in the history of agriculture and industry in the west . . ."

Non-competitive exploration leases can run a maximum of three years under the new regulations, with applicants required to outline their full development program. Competitive leases may be issued after determination of the successful bidder either at public auction or by sealed bids, according to the Department.

Fertilizer Plant in Ky.

Bluegrass Plant Foods, Inc., has begun the manufacture and bagging of fertilizer materials at its new plant in Cynthiana, Kentucky. The output is being distributed through dealers in central Kentucky. The plant has a capacity of 20,000 tons of mixed fertilizer annually.

Mixtures such as 6-8-6, 4-10-6, 3-12-12 and sulfate of potash for direct application are being prepared and shipped by the company to provide tobacco growers in the area a correct plant food for their soil needs. Officers of the Bluegrass Plant Foods Co. are: Osmer S. Deming, Lexington, Ky., president; Gene VanDeren, Cynthiana, vice-president, and W. C. Curry, Jr., Lexington, plant superintendent.

SOUTHERN MEETING

(*Continued from page* 50C)

ruary 1 and 2, at the same time as the meeting of the Cotton States Branch of the American Association of Economic Entomologists which was also in session on the campus.

Divided into some 19 sections, the A.S.A.W. program consisted largely of concurrent sessions, all following the general theme of "Progress in the South through a Balanced Agricultural-Industrial Economy." Sections included Agricultural Economics and Rural Sociology; Agricultural Editors; American Society of Agricultural Engineers (southeast section); Agronomy section; Animal Husbandry; Southern Section of the American Dairy Science Association; the Cotton States Branch of the A.A.E.E. (reported in full in this issue); Forestry; Horticulture, Marketing, Southern Division of the A.P.S.; Plant physiology; Soil conservation; the Southern Weed Conference (also reported in this issue); and poultry, home economics, etc.

CANNER'S MEETING

(*Continued from page* 33)

tion to timing of arsenical applications to avoid residues have not solved the residue problem completely, he stated. However these studies have brought to light the limitations on the use of arsenicals and the restrictions that must follow the use of any insecticide of which the residue is considered to be dangerous to man, he said. For example, he pointed out, if residues from use of DDT, BHC, TDE, chlordane, toxaphene and others are as much of a menace to man as the arsenicals, their use for the control of insects affecting vegetables must be subject to the same restrictions. That is, these insecticides should not be used on the crop when it is bearing the edible foliage or fruit unless it is known that the residue can be removed.

NO DDT FOR DAIRIES?

Rumors were being voiced around by the industry at press time to the effect that DDT had been "banned" by the Food and Drug Administration for use in dairy barns, on dairy herds, and from feed and forage being fed to them.

The facts are these, in the words of an FDA spokesman: "A dairy sanitarian asked the Food and Drug Administration whether DDT could be used safely in dairy barns and on dairy cattle. The FDA pointed out that it has been clearly shown that DDT appears in the milk fat when DDT sprays are used in dairy barns and on dairy cattle or when fodder bearing residues is fed.

"The Food and Drug Administration has issued no edict banning such use of DDT. It has no authority to do so. It does have the duty of protecting the interstate food supply from adulteration. DDT is a poison and its use under conditions which would contaminate milk—a food so universally used by infants and children—would be contrary to the Food, Drug, and Cosmetic Act.

"The answer given the dairy sanitarian was repeated by an FDA representative at a meeting of the National Committee of Food Sanitarians in Chicago on January 28. One inquiry was made as to whether methoxychlor might be a suitable substitute. The answer was given that this substance would probably be unobjectionable from the health standpoint but that its effectiveness was a question for the entomologists to answer."

A spokesman from USDA, in commenting on the matter, indicated that there is need to review recommendations and directions for use of DDT on cattle and in dairy barns. "No doubt this will be extended to some changes in labels," he concluded.

GUEST EDITORIAL

(*Continued from page* 23)

gested for plant stimulation are naturally occurring radioactive materials such as radium and uranium. These were available long before the advent of the Manhattan Project and the atomic bomb. So far as we are able to determine, there has been no successful practical use of radioactive materials as direct stimulants of plant growth or to improve plant quality. Many claims have been made by private individuals and many papers have been published, but so far the claims have not stood the test of careful experimentation such as that carried out during the past year by the United States Department of Agriculture in cooperation with a number of state experiment stations under an Atomic Energy Commission contract. Further research is required before much may be said whether radioactivity has any beneficial effect on plant growth, but it can be said rather definitely, that there is no evidence at the present time to indicate that these materials should be used for any purpose other than scientific experiments.

Outside of the field of soils and fertilizers it is of course well known that radioactive substances, because of the rays they emit, can bring about genetic changes, both beneficial and harmful, in the heritable characteristics of plants.

A bit of careful thinking will show the reader that radioactive phosphorus or calcium as tracers can serve a very useful function in soil and fertilizer research; that mutations produced by radioactive disintegration may aid in plant breeding studies to produce better plants. These valuable atomic energy developments in no way depend upon, nor are they related to the unsubstantiated claim that radioactive materials function as plant stimulants.

PYREFUME SUPER 20

WELL-ESTABLISHED

EFFECTIVE

DEPENDABLE

Preference for pure pyrethrum extract, either alone or combined with residual, slow-acting insecticides, is undoubtedly based on the experience of manufacturers and users over many years.

Clear and light gold in color, Pyrefume Super 20 is checked for effectiveness in our entomological laboratory. Its pyrethrins content is, of course, standardized at 2 grams per 100 cc. This dual control assures Pyrefume's spectacular action.

PENICK INSECTICIDE BASES

PYRETHRUM	Pyrefume Super 20 • Powder • Emulsifiable Pyrefume
PYRETHRUM PLUS SYNERGIST	Pyrexcel 20 • Pyrexcel Roach Powder • Emulsifiable Pyrexcel 80
ROTENONE	Liquid Extract • 5% Emulsifiable • 5% Powdered Cube or Derris
PENICKLOR (Chlordane)	50% Wettable Powder • 46% Emulsifiable • 50% Emulsifiable—Stable 33% Emulsifiable—Stable and Transparent • 20% Oil Solution
DDT	50% Wettable Powder • 25% and 30% Oil Solutions 25% and 30% Emulsifiable Concentrates
FOR RODENT CONTROL	Dethdiet Red Squill Powder • Rodine (liquid extract of red squill) Antu Technical • Antu 20% Tracking Powder

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Penick in Ryania Root

S. B. Penick & Co., New York, have announced that they have been licensed by Merck & Co., Rahway, N. J. under U. S. Patent No. 2,400,285 to produce and market ryania root powders and compounds for insecticidal purposes. Ryania root which contains the insecticidally active alkaloid, ryanidine, stated the Penick announcement, has been found beneficial as a specific control for the European corn borer and has the added advantage of leaving no active residue. Ryania is the root of a South American plant somewhat similar to cube whose insecticidal properties were brought to light through Merck research.

•

S. C. Fertilizer Meeting

A three-day conference of the South Carolina fertilizer inspectors was held at Clemson the last week of January. Appearing on the program were Dr. H. P. Cooper, director of the S. C. Agricultural Experiment Station; H. A. Woodle, leader, Clemson Agronomy Extension Work; R. A. McGinty, vice-director of the S. C. Experiment Station B. D. Cloaninger, head, Clemson College Department of Fertilizer Inspection and Analysis; R. H. Garrison, S. C. Seed Certification program; J. B. Douthit, member of the Board of Fertilizer Control; L. M. Sparks, Clemson extension cotton insects and diseases specialist; Dr. W. R. Paden, agronomist of the S. C. Experiment station; and Dr. G. H. Collings, professor of agronomy.

•

Changes in Powell Co.

H. Alvin Smith, executive vice-president of John Powell & Co., Inc., New York, has announced a number of changes in the company's service facilities. A new technical service department has been organized, in charge of Kenneth Nash, formerly head of the Powell biological testing laboratory in New York.

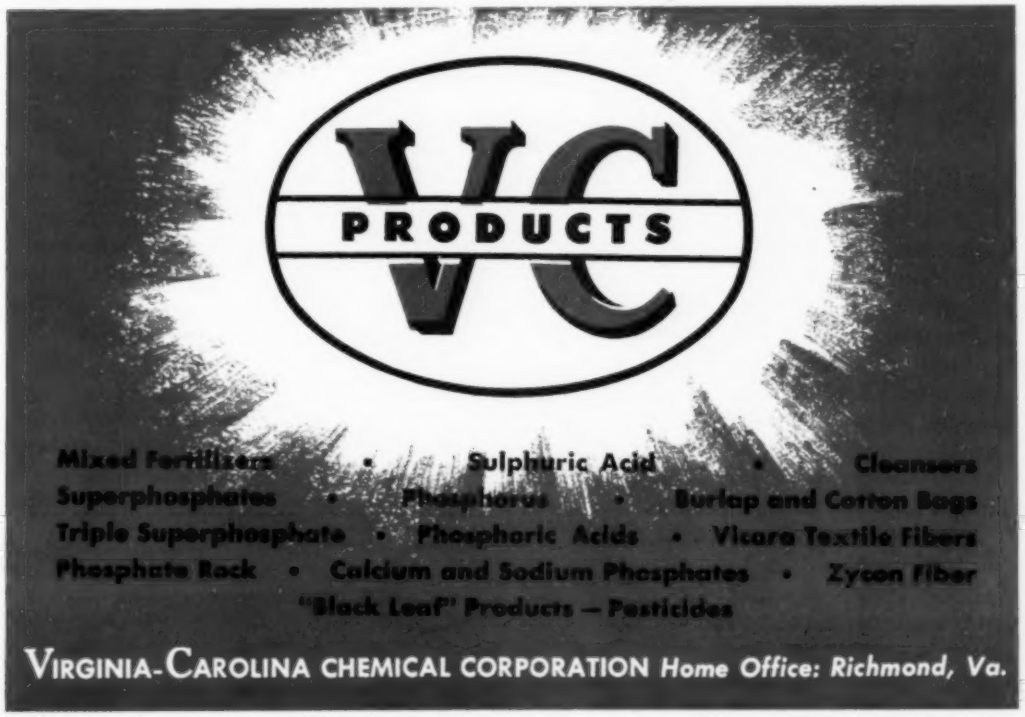
Other steps include the transfer of the Powell laboratory to the company's Brooklyn plant and the closing of the San Leandro, Calif., plant to make way for the establishment of new facilities. The California change will permit better servicing of that area, Mr. Smith stated.

The St. Louis sales office is being transferred to Fort Worth, Tex., where additional warehouse facilities are available to make possible prompt shipment of orders in the southwest.

•

Co-op Moves to Phila.

United Cooperatives, Inc., Alliance, Ohio, has announced the removal of its Farm Chemicals Department offices to larger quarters in Philadelphia. The new address is suite 2602 Fidelity-Philadelphia Trust Bldg., 123 S. Broad St. The telephone number is KIngsley 5-3035.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Mixed Fertilizers • Sulphuric Acid • Cleansers
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Rx for Spatulitis
DO YOU see spots before your eyes . . . feel distressed at the thought of a customer armed with a spatula . . . then it's high time you consult Sprout-Waldron & Co.

A CAREFUL diagnosis would probably reveal a lack of uniformity in your insecticide product — caused by inefficient or outmoded equipment . . . unsuited to the specialized job of producing a lump-free blend of high uniformity.

In over 30 states, satisfied users of Sprout-Waldron Intimate Blending Systems keep their customers happy. They have found the cure for SPATULITIS through low-cost, quality production.

As so successfully demonstrated in widely diversified installations, a Sprout-Waldron System is adaptable to the most rigid requirements of every dust producer.

When you buy Sprout-Waldron, you get a complete system engineered and specified in every detail by experienced men for greater production and a top quality product. The extras are: high efficiency . . . low operating costs . . . a safe, dust-free plant.

We believe that you realize the importance of planning now for your Intimate Blending System. Accordingly we are prepared to make specific recommendations to meet your individual installation requirements anytime at your convenience. Consult Sprout-Waldron and Company, 7 Waldron St., Muncy, Pennsylvania.

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Nelson Fellowship Chm.

Franklin C. Nelson, Roselle, N. J., was re-elected chairman of the Industrial Advisory Council of the Thomas J. Headlee Research Fellowship in Entomology at the council's third meeting held recently at Rutgers University, New Brunswick, N. J. The Council is composed of 25 commercial organizations which have contributed to the fellowship. Established in 1944 to honor the late Thomas J. Headlee as he retired as head of the New Jersey Agricultural Experiment Stations's department of entomology, the fellowship is dedicated to the advancement of fundamental research in entomology.

Firms represented on the Council include: American Cyanamid Co.; Carbide & Carbon Chemicals Corp.; Chipman Chemical Co.; Dow Chemical Co.; Goulard and Olena; GLF; Gulf Research and Development Company; Hercules Powder Company, Inc.; H. D. Hudson Manufacturing Company; Koppers Company, Inc.; P. E. Lirio; McCormick and Company, Inc.; Merck and Company, Inc.; Miller Chemical and Fertilizer Corporation; New Jersey Mosquito Extermination Commission; New Jersey Pest Control Association, Inc.; Niagara Sprayer and Chemical Company, Inc.; John Powell and Company, Inc., R. J. Prentiss and Company, Quality Lime Institute; Rohm and Haas Company; Seacoast Laboratories, Inc.; Esso Standard Oil Company; Texas Gulf Sulphur Company, Inc.; and Tobacco By-Products and Chemical Corporation.

•

Co-op in Convention

The National Council of Farmer Cooperatives, at its 20th annual convention at Memphis, Tenn., Jan. 3 to 6, endorsed a resolution urging that adequate funds be made available to the U. S. Dept. of Agriculture to facilitate basic fertilizer research. Another resolution urged the rapid development of power dams in the Pacific northwest and the extension of the Bonneville-Grand Coulee high power transmission lines to aid in opening up phosphate deposits in the northwest for production of phosphate fertilizers.

Still another resolution asked appropriation of adequate funds for protection of the nation's food and fiber supply against destruction by plant pests and disease. A fourth commended the governments of the United States and Mexico for the fight against foot and mouth disease and urged that the campaign be continued until this disease is eradicated from the continent.

•

Scott Award to Kharasch

The John Scott Award was to be presented to Dr. Morris S. Kharasch, University of Chicago, on January 26, at Wilmington, Delaware. The award, consisting of $1,000 in cash and a copper medal, was to be made in recognition of Dr. Kharasch's work in the field of alkyl mercurials. It was he who suggested the use of such compounds as ethyl mercury chloride as seed disinfectants and who developed improved reactions for their synthesis.

•

St. Regis Names Ferguson

Directors of St. Regis Paper Co., New York, recently announced that Roy K. Ferguson, president of the company, would assume position of chairman of the board, in addition to his present duties as president. James H. Allen, a director and president of the firm's subsidiaries, Florida Pulp & Paper Co. and the Alabama Pulp & Paper Co., was named to the newly-created position of vice-chairman of the board. Benton R. Cancell and William R. Adams were named as vice-presidents to fill vacancies caused by the recent resignations of Carl B. Martin and Lyman A. Beeman.

N. Central AAEE to Meet

The North Central States Branch of the American Association of Economic Entomologists will hold its annual meeting at the Hotel Schroeder, Milwaukee, Wisconsin, March 24 and 25, according to Dr. J. W. Apple, secretary of the group. At press time, no program had yet been published.

•

County Agents Elect

John H. Logan, Agricultural agent of Pinellas County, Florida, was elected president of the National Association of County Agricultural Agents at the group's recent meeting in Chicago. Rex Carter, Fayette County, Pa., was named vice-president; and C. G. Keller, Green County, Mo., secretary-treasurer. Regional directors were named as follows: C. Z. Keller, Somerset County, Md.; O. P. Kobert, Carbon County, Montana; T. H. Young, Laurence County, S. Dakota; and S. C. Rohman, McCracken County, Kentucky.

•

Shade Tree Meeting Held

The fourth annual meeting of the Midwestern Chapter of the National Shade Tree Conference was to be held February 17 and 18 at the La Salle Hotel, Chicago. Earlier announcements stated that a crowd of 300 was expected, and opportunities for questions and answers would be afforded on the program. President of the chapter is J. C. Carter.

•

Pace Becomes Vice-Pres.

John C. Pace was elected a vice-president of St. Regis Paper Co. at a meeting of the company's board of directors last month. Mr. Pace had been a vice-president and director of Florida Pulp and Paper Co. and Alabama Pulp and Paper Co., wholly-owned subsidiaries which were merged with St. Regis at the beginning of 1949.

Food Processors to Meet

The second Vegetable and Fruit Processors' School is scheduled to be held at Ohio State University, Columbus, March 14-26. Among the numerous topics scheduled for discussion, are rodent control and the effect of benzene hexachloride on peaches, tomatoes, etc. The meeting is under the sponsorship of the Division of Horticultural Products of the Ohio Department of Horticulture. Announcement of the event was made by H. D. Brown, professor of Horticultural Products.

•

Southern Conf. for March

Announcement has been made of the 1949 Southern Shade Tree Conference, to be held at Gainesville, Fla., March 23-25. According to Dr. John T. Creighton, chairman of the arrangement committee, the Thomas Hotel, Gainesville, will be headquarters for the meeting. It is suggested all requests for hotel reservations should be forwarded to Dr. Creighton, P.O. Box 2845, Gainesville, at least two weeks before the conference begins.

•

Pitt Buys Micronizer Co.

Pittsburgh Plate Glass Co., Pittsburgh, has announced its purchase of the plant and manufacturing facilities of the Micronizer Co., Moorestown, N. J. The latter firm is a producer of "Micronized" fungicides and insecticides.

The Pittsburgh company will operate the facilities as the Micronized Products Department of the Corona Chemical Division, according to C. M. Melander, Sales Manager of the Corona Chemical Division. The purchase was made to improve service for Corona Division customers, and to provide for expansion of the line of Corona insecticides and fungicides available in the eastern part of the U. S.

Equipment will be installed at Moorestown for the manufacture of a full line of insecticide and fungicide dusts. The Corona Chemical Division plans to serve growers in the areas of New York, New England, New Jersey, Pennsylvania, Virginia and the eastern shore.

The Micronizer company will continue as a licensing organization under their patents; the trade mark "Micronized" as applied to insecticides and fungicides has been assigned to Pittsburgh Plate Glass Co.

Factory manager of the Micronizer Co. plant at Moorestown is A. C. Hobbie. Sales will be handled by C. M. Melander.

•

Deuber to Centro Labs.

Centro Research Laboratories, Inc., Briarcliff Manor, N. Y., has announced the appointment of Dr. Carl Deuber as assistant Director. Dr. Deuber, a native of St. Louis, was formerly with Stauffer Chemical Co., New York.

Here's the

Stauffer Line for '49

Glance through this comprehensive list of agricultural chemicals. Stauffer has the basic materials ready for further processing or mixing.

Write to the nearest Stauffer office for information on the Stauffer line for '49.

2,4-D
Amine and Ester Concentrates
SULPHURS
Spraying - Dusting - Soil - Burning - Mixtures
DDT
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Technical and Concentrates
TOXAPHENE
Wettable and Dust Concentrates
THIOPHOS PARATHION
Wettable and Dust Concentrates
FUNGICIDE 341-C
An Oil Compatible Fungicide
CALCIUM ARSENATE
CRYOLITE
SOIL NUTRIENTS
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555 South Flower Street, Los Angeles 13, California
221 North LaSalle Street, Chicago 1, Illinois
636 California Street, San Francisco 8, California
Apopka, Florida • Houston 2, Texas • Weslaco, Texas

Plastic Coating Offered

B. F. Goodrich Chemical Co. has announced the development of a plastic coating which offers the horticultural field and fresh food packaging industry a new technique in preserving and packaging. Use of the material, called "Good-rite vinyl resin latex," is expected to aid horticulturalists and the packaging industry in minimizing spoilage and wilt damage to fruit, vegetables, and other products. Three years of intensive research has preceded its introduction commercially, the company reports.

A preservative coating of the material is said to prolong the life of flowers, vegetables or trees for hours, days and even weeks.

•

To Set Up Pilot Plant

Minnesota Mining & Mfg. Co., has announced that pilot plant production has been started at St. Paul, Minn., on the group of chemical compounds known as fluorocarbons, which will be promoted, first, for use in aircraft and automotive lubricants. Other possible uses, to be developed later, include new insecticides, fungicides, germicides and fumigants, the company states.

•

"Corn King" Testifies

Newton L. Halterman, Rushville, Ind., farmer who was crowned "Corn King" at the recent International Livestock Exposition in Chicago, credits his liberal use of fertilizers for a large part in bringing him his world championship. Halterman believes in "pouring it on," so far as fertilizers are concerned, according to an interview published recently.

On his seed corn acreage last season, Halterman said, he plowed under 500 pounds per acre of 8-8-8. In addition he plowed under 200 pounds of 33-1/3 percent nitrogen on 50 acres. At planting time he applied 125 pounds per acre of 3-12-12 to all his corn land. On small grain—legume seedings such as oats and alfalfa, he applied 300 pounds per acre of 3-12-12.

•

Emulsol Appoints NY Firm

Emulsol Corporation, Chicago, has announced the appointment of Pesticide Advisory Service, New York, as its technical sales representative in the agricultural, sanitation and industrial chemical manufacturing industries in the state of New York and upper New Jersey.

•

New Dow Phenol Plant

Dow Chemical Co., Midland, Mich., has announced completion of new facilities which are expected to expand the company's annual production of phenol by 30 million pounds. The new plant, now in production, is regarded as a potential help in alleviating the phenol shortages which have been evident since the end of the war. The Dow company instituted the manufacture of synthetic phenol in the U. S. in 1915 and has long been an important supplier of the material which is widely used in the manufacture of various agricultural chemicals.

•

Cooney Joins Flag Sulphur

Ray H. Cooney has been appointed by Flag Sulphur & Chemical Co., Tampa, Fla., as its field representative in Florida. Mr. Cooney joined the Flag organization on Jan. 1, 1949, after having spent a number of years with the Adams Packing Co., Auburndale, Fla. Mr. Cooney's home is in Winter Haven, Fla.

•

Open New York Office

Brooklyne Chemical Works, Inc., Baltimore, has announced the opening of a New York sales office at 37 Wall Street. The company is a basic manufacturer of copper sulfate and basic copper sulfate for agricultural purposes; copper sulfate for industrial purposes; and other metallic chemical salts.

Program Committee Chm.

Leo R. Gardner of California Spray Chemical Corp. has been named to head the committee on programs for the industrial conferences to be held during the Pacific Chemical Exposition in November, 1949, and L. W. Van Doren of Oronite Chemical Co., will head the committee on information, it was announced by Dr. Richard Wistar, chairman of the California section of the American Chemical Society, which is sponsoring the show.

•

Comm. Solvents Names Two

Commercial Solvents Corp., New York, has elected two new members to its board of directors. These are: Austin S. Igleheart, president, General Foods Corporation, and Harold H. Helm, president of the Chemical Bank and Trust Co., New York.

•

Wobus to New Position

Monsanto Chemical Co., St. Louis, Mo., has announced that R. S. Wobus has been appointed assistant manager of the company's plant at Monsanto, Ill. Mr. Wobus has been assistant to the plant manager at the John F. Queeny plant at St. Louis.

•

Speaks on Radiation

Results of research in the application of atomic energy to agricultural problems have so far, been "hopeful and encouraging," David E. Lilienthal, chairman of the Atomic Energy Commission, told Ohio farmers at the recent annual convention of the Ohio Farm Bureau Federation in Columbus.

But atomic energy is not magic, nor a cure-all, Lilienthal said, and he warned the farmers that "There are always some who will attempt to exploit public interests for private gain." "Look hard," he said, "before you invest your money in materials purporting to increase crop growth or yield through radiation."

Lurking in the fields . . . destroying crops . . . causing untold damage are a number of new *unknown killers*. Among these recently discovered insects, one particularly voracious marauder seemed to defy all types of control—until growers tried *Pyrenone Triple Mix Dust*.*

We still don't know this culprit's name, but we do know that he quickly succumbs to a treatment of Pyrenone Triple Mix Dust. And we know, too, that Pyrenone Triple Mix Dust is highly effective against more familiar tough-to-kill insects—like the Mexican Bean Beetle...the Tobacco Horned Worm . . . the Leaf Hopper . . . and the Cabbage Looper.

And economical pyrenone agricultural insecticides furnish their highly effective control *without hazard of toxicity*—either from dusts, spray mists, or residues.

Plan now to offer your customers pyrenone-type insecticides next season. For further information just write or phone your nearest U.S.I. office.

*A combination of pyrethrum cyclopentenolone, pyrethrins and rotenone.

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Fertilizer News

A. P. F. C. to Bretton Woods

The American Plant Food Council, Washington, D.C., has announced that its fourth annual convention will be held at the Mount Washington Hotel, Bretton Woods, New Hampshire. The dates are set for June 19-22, 1949. Clifton A. Woodrum, A.P.F.C. president, stated that an outstanding program is being arranged to include nationally-known leaders in fields of agricultural education and research.

Located on a 10,000 acre estate, the Mount Washington Hotel can accommodate 500 guests, it was pointed out. J. A. Howell, executive vice-president of the Virginia-Carolina Chemical Corp., Richmond, Va., is chairman of the convention commitee. Other members include C. B. Robertson, president, Robertson Chemical Corp., Norfolk, Va. and Fred J. Woods, vice-president of Gulf Fertilizer Co., Tampa, Florida. Last year's convention was held at the Greenbrier Hotel, White Sulphur Springs, W. Virginia.

•

Miss. Chem. Statement

Mississippi Chemical Corp., Jackson, Miss., expects to distribute its products through regular trade channels, according to a recent statement by J. S. Williams, president. The statement was made to halt rumors which persisted in the south that the fertilizer manufactured by the corporation would be distributed through cooperatives exclusively. Mr. Williams emphasized that there is "absolutely no foundation for this report." He continued by saying that "the production of the plant will be distributed through centers set up by the stockholders themselves. . . . If some coop happens to own stock in the corporation, they will get their allotment of fertilizer exactly as will any other stockholder. There will be no connection or control of the Mississippi Chemical Corporation by any cooperative," he concluded.

•

Texas Plant Opens

Initial operation of the partially completed ammonium sulfate plant of the Phillips Chemical Co. at Port Adams, Houston, Texas, began on January 9. About 150 employees were at work as the plant began production, and approximately 200 will be employed eventually.

Final completion of the plant construction and full scale production is scheduled for the latter part of February. Plant construction is in charge of the Chemical Construction Corp., New York.

•

Fertilizer Stock Sold

A co-operative fertilizer plant costing some $600,000 will soon be built under sponsorship of the Arkansas Farm Bureau Federation to alleviate a long-existing shortage of fertilizers in the state, the Federation has announced. Half of the cost will be financed by sale of stock to farmers and half by a loan from the St. Louis Bank for Co-Operatives. Sale of stock was to begin in January, with the provision that if earlier specifications for the plant do not appear to meet the demand indicated by stock purchasers, they will be enlarged. The Atlanta Utility Works of Atlanta, Ga., designers of plants of this type, was to submit preliminary specifications to steel-fabricating companies for bids in December.

Although the plant could be operated as a tax-exempt co-operative, the Arkansas Farmers Plant Food Company will be incorporated to operate it as a private stock company. Incorporation, sale of stock, and plant construction will be directed by a joint committee of the Arkansas Farm Bureau Federation and the new incorporation.

M. D. Broadfield of Little Rock, Ark., who has had more than 18 years' experience in fertilizer plant operation, will be manager. Location will be determined by freight rates, utility rates and concentration of stock sales. Products will include potash, phosphate, mixer fertilizers, and liquid and solid nitrogen.

•

CFA Names Committee

Earl R. Mog, Growers Fertilizer Co., San Francisco, president of the California Fertilizer Association, has announced the names of committee chairmen and members for 1949. They are as follows:

Advisory Committee: Ned Lewis, Southwestern Supply Co., Los Angeles, chairman; Byron Reynolds, Bandini Fertilizer Co., Los Angeles; and Dr. Wallace Macfarlane, Pacific Guano Co., Berkeley. **Budget Committee:** J. Quinn, California Sun Fertilizer Co., Los Angeles, chairman; Grover Dunford, Inland Fertilizer Co., Los Angeles; and Col. B. H. Jones, Sunland Industries, Inc., Fresno. **Constitution and By-Laws Committee:** T. W. Houser, So. Calif. Fertilizer Co., Los Angeles, chairman; Wm. Snyder, Wilbur-Ellis Co., San Diego; and H. Conley, Pacific Guano Co., Berkeley. **Entertainment Committee:** George Bloxham, Wilson & George Meyer Co., chairman; Dr. R. Neidig, Balfour, Guthrie & Co., Ltd., Los Angeles; W. Logan, Producers Sales Co., San Francisco; and F. Durbin, Shell Chemical Co., San Francisco.

The **Legislative Committee** is composed of Lowell Berry, Best Fertilizer Co., Oakland, chairman; Ralph Crum, Pacific Guano Co., Berkeley; and Col. B. H. Jones.

Membership Committee: William Simas, Triangle Co., Salinas,

SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*MAN MADE MOUNTAINS

Sulphur from the field collecting stations is delivered to the vats through insulated pipe lines which discharge directly on the vats. The sulphur is pumped at such a rate that the height of the vat is increased only a few inches per day, the slight vertical rise being the result of a large horizontal area which provides maximum cooling surface and ample tonnage capacity. As the sulphur solidifies it gradually builds up into a great block or vat of solid sulphur, which may be as large as 1200 feet long, 50 feet high, and 200 feet wide, and containing as much as half a million tons of sulphur.

The discharge lines are placed so that the liquid sulphur is spread in an even layer over the entire surface of the vat and is permitted to solidify uniformly. If the liquid sulphur is introduced too rapidly or is not properly distributed, pockets of liquid sulphur will be covered by a crust and remain in the solid sulphur. The low heat-conductivity of sulphur might keep such pockets liquid for a year or more.

Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.

TEXAS GULF SULPHUR CO. INC.

75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

chairman; R. J Nicols, Liquid Plant Food Co., Monrovia; John Parker, Fresno Agricultural Chemical Co., Fresno; and S. Tatem, Swift & Co., Los Angeles.

Nine members were named to the **Soil Improvement Committee.** Chairman is M. R. McCollam, American Potash Institute, San Jose. Committee members are: D. J. Raden, Swift & Co.; Dr. R. Neiding; F. Fulmer, American Potash Institute; W. Fetters, Best Fertilizer So.; Dr. Wallace Macfarlane, Dr. O. E. Overseth, executive secretary, California Fertilizer Association, Los Angeles; J. H. Nelson, Nelson Laboratories, Stockton; and F. H. Leavitt, Shell Chemical Co.

Other officers of the C.F.A., in addition to president Mog, are; vice-president, J. M. Quinn, California Sun Fertilizer Co.; Secretary, Paul Pauly, Pacific Guano Co.; Treasurer, Grover C. Dunford, Inland Fertilizer Co.

•

Superphosphate Supply

Supplies of superphosphate may now be termed abundant for the first time since 1941 and "indications are that farmers will have about 2,100,000 tons for the 1948-49 season, or more than enough to satisfy their demands," according to Clifton A. Woodrum, president of the American Plant Food Council, Washington, D.C. He reported that the indicated supply of more than two million tons of P_2O_5 for next season compares with less than a million tons in 1941, representing an increase of more than 100 percent.

"Indications that superphosphate supplies are exceeding demands are forcefully demonstrated by the fact that the U. S. Department of Agriculture recently asked bids on about 56,000 tons for use in conservation programs in seven states and as a result received offers from private industry of about 397,000 tons," Mr. Woodrum said.

Large increases in the production of superphosphate during the critical war and post-war periods have presented evidence that private industry, given a fair opportunity, can and will meet the demands of farmers in the future as they have been met so abundantly in all normal periods in the past, he pointed out.

•

Storage Lack Blamed

Lack of storage space is at least part of the cause of the shortage of fertilizer, according to Senator John Stenniss, Mississippi. Sen Stennis observed that manufacturers have large quantities of material on hand, and that if farmers would place orders right away and accept immediate delivery, this could alleviate the situation and prevent an "acute shortage" later in the cotton growing season.

The statement by Sen. Stennis has been echoed through-

AEROSOL D.D.T.
PARATHION

- TECHNICAL
- WETTABLE POWDER
- DUST

CUSTOM ESTERIFICATION OF 2, 4-D

- ISOPROPYL ESTER
- BUTYL ESTER

2, 4-D SALTS AND AMINES
CUSTOM MIXING
CUSTOM PACKAGING

- INSECTICIDES
- FUNGICIDES

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Antara Products
a division of
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Antara Extra

An Antara Products Publication

Detergents
Emulsifiers
Wetting Agents
Dispersants
Carbonyl Iron Powder

444 MADISON AVENUE NEW YORK 22, N. Y. FEBRUARY, 1949

ANTAROX A-200 PROVED ECONOMICAL, EFFECTIVE INSECTICIDE EMULSIFIER

The Story of ANTARA PRODUCTS

Antara Products, a division of General Aniline & Film Corp., has an interesting history. You asked for the details. Here they are:

In '41, a Special Products Sales Department was set up by General Aniline & Film Corporation to handle sales of Carbonyl Iron Powder, an electro-magnetic powder used mainly in cores in high frequency magnetic fields. This product, made only by General Aniline & Film Corporation in the U. S., is used, for instance, in most of the television and radio receiving sets manufactured here.

In 1946, the new Special Products Sales Department was given a product, with great possibilities, to promote in the consumer field. The product, sold under the trademark GLIM, a liquid-dishwashing detergent, was sold recently to B. T. Babbitt, Inc., after its market potential had been demonstrated. Other products were developed with the idea of promoting them consumer-wise, the automatic dishwasher detergent, sold under the trade mark CHAT, as well as other yet unnamed clothes wash, car wash and similar detergents.

The phenomenal growth of the GLIM product, and other Antara detergents and emulsifiers made it necessary to change the structure of the Special Products Department to a name division. The result was Antara Products.

With the sale of the GLIM product, the new division changed its selling policy and is now concentrating on the sale of Carbonyl Iron Powder, surface active agents and chemicals for the industrial field. Its knowledge in the field of surface active agents dates back many years. Antara Products markets many types of detergents, and through the know-how and patent folio of the General Aniline & Film Corporation is able to manufacture many other different types of detergents.

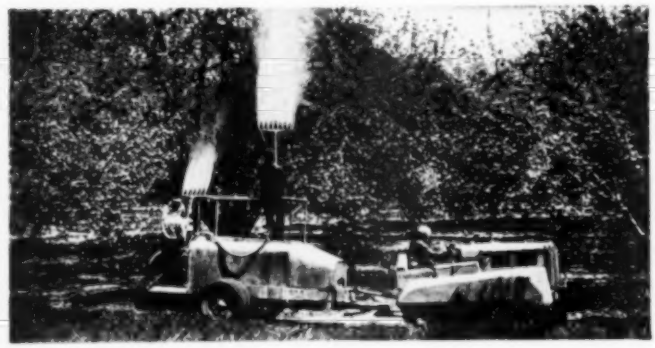
Marked economy with increased efficiency in emulsifying insecticide and herbicide concentrates is now available to packagers of insecticides and weed killers. Name of the new emulsifier which offers reduction in costs is Antarox A-200.

A result of incisive research by Antara Products, a division of General Aniline & Film Corporation, Antarox A-200 is a liquid, non-ionic emulsifier of the aromatic polyglygol ether family. Versatile Antarox A-200 makes stable, easily-compounded emulsions with Chlordane, Toxaphene, DDT and *2, 4-D*.

Antarox A-200, the company says, will emulsify more Chlordane than other leading emulsifiers and is therefore cheaper to use. Detailed information on savings effected with Antarox A-200 is available upon request.

Experts report that Antarox A-200 offers many other advantages to the compounder of herbicides and insecticides, such as stability and wettability.

A booklet describing these and other interesting aspects of Antarox A-200 is available on request to Antara Products, Dept. 24.



Insecticide emulsions prepared with Antarox A-200 are more stable and more economical than those made with most other emulsifiers. Hardness of water is no drawback with Antarox A-200, a non-ionic emulsifier.

FROM RESEARCH TO REALITY
GA&F
Antara Products
A DIVISION OF
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444 Madison Ave.
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out the nation by numerous newspaper and magazine articles and editorials urging the early purchase of fertilizer materials.

•

St. Regis Dividend

Directors of St. Regis Paper Co. have declared a regular quarterly dividend of 15 cents a share on the common stock, payable March 1 to stockholders of record February 4.

MARKET REPORT

(*Continued from page 47*)

improvement is expected during the next 2 to 3 months. There is one large producer delivering promptly on contract, while the two smaller producers in terms of production, are delivering only small quantities at this time. There are others who have indicated an interest in the production of technical parathion, but to date there are only three known to be producing actively.

The price has held fairly firm at $2.50 lb. in carload quantities, and there appears to be no possibility of a weakening on this price structure for this season. Prices on dust concentrates and wettable powders are based on this level for the technical material. Industry feels that with the liberalization in allowable claims for the use of these materials, that there will be a strong demand this season in spite of rumblings in the industry about problems of residual toxicity.

Arsenicals

SHARP increases in the price of lead have raised the price of lead arsenate once again. The price of the lead metal has now advanced to an all time high of 21½c lb., New York, and the available lead arsenate is being quoted at 31½c lb. in carload lots, large bags.

Zinc-containing and copper-containing materials are in the same supply and price situation as they were during January. There is not a great deal of movement at this time in copper sulfate, monohydrated copper sulfate or basic copper sulfate for the agricultural season. Producers of the material have normal inventories but are finding ready markets for the metal itself. Consequently, they do not appear to be too concerned about the inventories of copper containing materials which they have on hand.

DDT Production Down

PRODUCTION of DDT for the first nine months of 1948 was less than 12 million lbs. and although figures are not available for the last three months' production, it is a safe assumption that the production will not exceed 16 million lbs. for the calendar year 1948. This compares with a production of about 50 millions lbs. for the calendar year 1947. Technical DDT is still being quoted at 32c lb., but there is no great

2, 4-D

2,4-Dichlorophenoxyacetic Acid
Sodium Salt
Triethanolamine Salt
Methyl, Isopropyl, Butyl Esters
40% Butyl Ester; 44% Isopropyl Ester

DDT

Dichlorodiphenyltrichloroethane
100% technical grade
50% Wettable Dust
25%, 30%, 40% emulsifiable solutions

ALPHA NAPHTHALENEACETIC ACID
and Methyl Ester

Kolker Chemical Works, inc.
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Manufacturers of Basic Agricultural Chemicals

movement in the domestic agricultural field or in the export field at this time.

Benzene Hexachloride

BENZENE Hexachloride production indicates an upward trend but it is a little too early to tell what the price situation is going to be eventually. As noted above, there was a temporary weakening possible in view of the large Government bid, but many spokesmen of the industry discount this since there was such a great quantity involved and do not feel that this will have any effect on the domestic price outlook.

Paradichloro benzene is in very free supply and there is no great movement of the the material at this time. Nicotine sulfate continues to be in tight supply position and does not appear to have suffered any in its demand by the impact of the various phosphate insecticides. 2,4-D production is showing a steady increase and the October 1948 production was in the neighborhood of 2,300,000 lbs., presumably in terms of acid.

•

"Heptachlor" Accepted

The adoption of "heptachlor" as a common name for a complex chlorinated hydrocarbon which has been used experimentally as an insecticide, has been announced by S. A. Rohwer, assistant chief of the U.S.D.A. Bureau of Entomology and Plant Quarantnie. The material, related to chlordane and having the empirical formula $C_{10}H_5Cl_7$ has been used experimentally for the past two seasons. Limited quantities have been supplied by Julius Hyman & Co., Denver, Colo., and the Velsicol Corp., Chicago.

The name heptachlor has been presented to the Trade Mark Division of the U.S. Patent office where it will be recorded and available for citation should any application for trademark of the name be filed.

•

Mathieson Buys Southern

Mathieson Chemical Corp., New York, has announced the purchase of Southern Acid & Sulphur Co., Inc., with plants at Houston, Beaumont, and Port Arthur, Texas; Shreveport, La.; and at Little Rock, McKamie and Macedonia, Arkansas.

This purchase gives Mathieson an immediate position in the fields of sulfuric acid and fertilizer and wil serve to diversify further the line of basic Chemicals already produced by Mathieson. The Company's chief products had been caustic soda, soda ash, chlorine salt cake and ammonia.

•

Pennsalt Advances Bixby

Arthur F. Bixby has been advanced by Pennsylvania Salt Manufacturing Co., Philadelphia, to the position of assistant sales manager of the company's agricultural chemical division, it was announced recently.

•

NFA Film Previewed

The National Fertilizer Association, on February 8, presented the Washington preview of the Association's new sound and color movie, "What's in the Bag." The event, held at the Mayflower hotel, was attended by some 125 representatives of the industry, governmental agencies and the press.

The NFA has announced that the 800-ft., 18-minute film, is available for loan. Applications are to be made through the NFA office, 616 Investment Building, Washington 5, D. C.

Photography for the new film was made by Robert Engle of he Association, with the cooperation of State Agricultural experiment stations, the U.S.D.A., agricultural scientists and farmers.

Dr. Russell Coleman, NFA president, was in charge of the Washington showing, and in an introductory talk stressed the need of cooperation within the entire industry, necessary to the benefit of all. He called attention to the fruits of cooperation between industry and Government during the past years, and emphasized the fact that the fertilizer Association is anxious to continue such cooperation.

Have You a DUST BLENDING PROBLEM?

Our Engineers will be glad to help you to solve any mixing or blending problem you may have.

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The YOUNG MACHINERY COMPANY

MUNCY PENNSYLVANIA

GRASSHOPPER INFESTATION

(*Continued from page* 45)

applied properly, at the right time, and in the right places. Timely spraying or dusting of young grasshoppers in their breeding areas when the main hatch is completed or when they begin to move from the hatching grounds will destroy them before they move into cultivated crops and greatly reduce the acreage to be treated. Emphasis is placed on precautions to avoid feeding forage treated with these insecticides to dairy animals or to animals being finished for slaughter, on avoiding applications to legumes in bloom to reduce the possible hazard of harm to pollinating insects, and on avoiding residues of the chemicals on fruits and vegetables. This new publication points out that grasshopper control has been improved by the use of these new organic insecticides in baits, as well as in sprays and dusts. Under certain conditions, such as in sparse range grass, grain stubble, or dry vegetation no longer atractive to the 'hoppers as food, bait has been found to be more economical and equally as effective as the sprays or dusts. Chlordane or toxaphene may be used in either wet or dry baits.

Thus it is apparent that farmers in areas where serious grasshopper outbreaks are likely to occur now have available more effective methods than ever before to aid them in preventing or reducing crop losses. Nevertheless, it is still important that to insure successful control of the 'hoppers all property owners in a community cooperate in destroying threatening infestations.

Corn Borer in Southwest

THE northern and eastern limits of distribution of the southwestern corn borer in Kansas and Oklahoma in 1948 were practically the same as in 1947, according to a survey conducted this past fall by the Bureau of Entomology and Plant Quarantine, in cooperation with the Agricultural Experiment Stations of those states. An increase in intensity of infestation was observed in some counties along the eastern border of the area. Most heavily infested of the areas surveyed in the two states were the sandy soil sections of Barton, Stafford, Rice, Reno, Edwards, Pratt, Barber and Kingman Counties in south-central Kansas. Light to heavy infestations were observed in central Oklahoma, the heaviest being in Noble County.

European Borer in 1948

THE spread and abundance of the European corn borer during 1948 were discussed in this column last month. Estimates of the amount of damage which that insect caused to corn during the same period are now available.

What's Your Problem?

Aphid Spray
•
Nicotine Base for Dust
•
Controlling Poultry Roundworm
(Ascaridia galli)
•
Delousing Poultry
•
Dip and Drench for Sheep, Goats
•
Control of Certain Cattle Lice
•
Greenhouse Fumigation
•

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Surely Has The *Answer*—In These Products Identified by the Renowned

BLACK LEAF

Black Leaf

1. The FAMOUS BLACK LEAF 40—for spraying or dusting to control small sucking insects, plant lice, and similar pests. Also used to control external parasites of cattle, sheep and poultry—and as a drench for sheep.
2. BLACK LEAF 155—for spraying apples and pears to control codling moth, also for controlling grape berry moth.
3. BLACK LEAF DRY CONCENTRATE—used as a spray or dust—a dry powdered nicotine compound for easy mixing and handling.
4. BLACK LEAF 155 WITH DDT—for spraying apples and pears for the control of codling moth, leafhoppers, and similar pests.
5. BLACK LEAF 10 DUST BASE—meets the demand for a nicotine compound easily mixed with non-alkaline carriers to make a neutral dust.
6. BLACK LEAF CUNIC DRENCH—for sheep and goats. Formula recommended by U. S. Department of Agriculture.
7. BLACK LEAF POWDER AND PELLETS—for controlling the large roundworm (Ascaridia galli) in chickens.
8. MASH-NIC—for mixing with poultry feed to control large roundworm.
9. NICO-FUME LIQUID—for greenhouse spraying and fumigating—especially refined.
10. NICO-FUME PRESSURE-FUMIGATOR—spreads penetrating fumes under pressure—controls aphids and similar insects in greenhouses.

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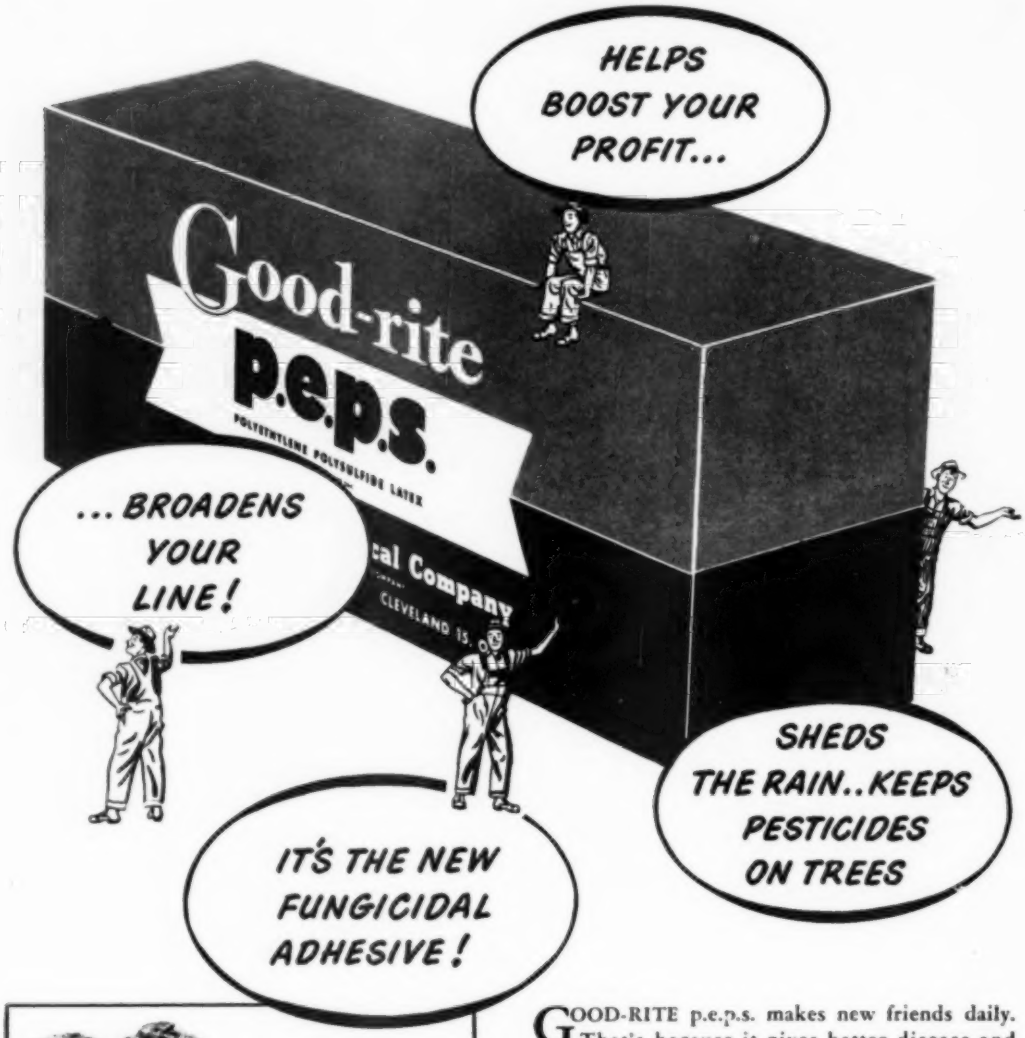

THE NEW EASY-TO-USE "BRICK"

Each 4-lb. package contains two heavy-foil wrapped cartridges. Simply unwrap, crumble, dump on screen and wash in with water. Each cartridge makes 400 gallons.

GOOD-RITE p.e.p.s. makes new friends daily. That's because it gives better disease and insect control—helps produce more salable fruit.

Good-rite p.e.p.s. is a new and highly effective fungicidal "sticker"—proved in four seasons' tests. Our promotion is bringing in many orders—some of them probably from your territory.

Get all the facts about this new agricultural chemical. Find out how it can help broaden your line... increase your profits . . . build new customers for you. Please write Dept. AG-2.

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The loss in corn production was more than twice that of 1947, as it is estimated that this insect reduced the 1948 crop of field corn by 85,485,000 bushels. At present corn prices, this loss amounted to about $99,000,000. In addition, the borer damaged sweet corn to the extent of about $4,000,000, making the total value of corn lost in 1948 about $103,000,000. This is about $6,500,000 higher than the estimated loss for 1947. However, at that time corn sold for about $2.40 per bushel, whereas the estimated loss for 1948 is based on $1.20 corn. The greatest loss, nearly $46,000,000, occurred in Iowa. Considerable dollar losses from corn borer damage also occurred in Illinois (26 million), Minnesota (8 million), Indiana (7 million), and Ohio (5 million). Further details are available in a Special Supplement to the Insect Pest Survey (1949, No. 2) entitled "Estimates of Damage to Corn by the European Corn Borer in the United States in 1948."

Effect of Cold Weather

LOW temperatures around the first of the year caused a marked reduction in insect activity and development in parts of South Carolina, Georgia, and the Gulf Coast and were reported to have caused heavy losses to beans, squash, cabbage, sweet corn, and other vegetables in the southern Florida truck-growing district. Consequently, very few reports on insect infestations have been received in recent weeks.

Populations of cabbage caterpillars were generally moderate to heavy on cabbage and related crops in parts of Georgia, Florida, and southern Texas in late December and light to moderate in parts of Virginia and Louisiana. Aphid populations on crucifers were generally moderate to heavy at that same time in parts of Florida, California, and southern Texas. They were reported as generally light in the South on crucifers following the occurrence of low temperatures around the first of the year. The turnip aphid, however, was damaging turnips, other greens, and radishes in Texas early in January. The cabbage looper was present at that time in destructive numbers on cabbage and lettuce in the lower Rio Grande Valley of that State. Aphids and cucumber beetles were also damaging lettuce there, and darkling ground beetles were causing injury to young tomato plants. The rusty-banded aphid was causing serious injury to carrots in southern California early in January. The vegetable weevil has persisted as an important pest of crucifers in the South, particularly on turnips and Chinese cabbage. The serpentine leaf miner was seriously abundant on tomato and potato in Florida throughout the latter part of December and early January.

A Simple Addition for Improved Quality

With DILUEX you can adopt a simple procedure that will regulate package volume to fit your container. Besides obtaining a uniform package appearance, your product will be greatly improved in

FLOWABILITY
DUSTABILITY
ADHESION
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Absorptive properties make **Diluex** a superior carrier for liquid toxicants. In preventing caking or agglomeration of liquid and oil impregnated dusts, **Diluex** will meet the most exacting requirements.
Investigate Diluex as a recommended constituent for your dust spray formulas.

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Gulf Production Begins

The Gulf Chemical Co., Houston, Texas, has recently begun production of phosphoric acid and other sodium and calcium phosphates at its $1,500,000 phosphate manufacturing plant located on the ship channel south of Galena Park, Houston. The plant is situated on a 19-acre tract and an additional 7 acre plot adjoins the present site for future expansion. The products of the plant will be used largely for liquid fertilizers.

Officers of the company are George A. Butler, Houston, president; Otto Schoenfeld, executive vice-president and general manager; Cecil A. Cook, secretary; J. M. Sheesly, treasurer; Clayton N. Smith, vice-president; William Taylor, assistant secretary and assistant treasurer. The board of directors is composed of the above-named officers and James A. Gray, president of the American Iron Works, Oklahoma City.

POLICY REPORT

(*Continued from page* 41)

and sugar beets should not be treated with 2,4-D.

Peas have been successfully treated with "DNOSPB" in many areas. While recommended for peas these materials should be applied according to the manufacturers' directions or recommendations of local weed officials.

Woody Plants

FOR killing woody plants sensitive to foliage sprays of 2,4-D, concentrations of 2000 p.p.m. (.2 percent) of the ester formulations are recommended where drift and volatility are not a problem. Under humid conditions the same concentration of the salts of 2,4-D may be used. Sensitive woody plants should be sprayed when in an active growing condition.

One pound of 2,4-D acid equivalent in an emulsion of one gallon of diesel oil and four gallons of water per acre applied by airplane as a foliage spray is effective for controlling sand sagebrush on rangeland, when the plants are actively growing.

Concentrated 2,4-D formulations aplied to surfaces of stumps and canes cut as closely as possible to ground level will kill some shrubs and trees that are tolerant to foliage sprays of 2,4-D. No minimum concentration has been determined, but not less than 5 percent should be used. This treatment is effective at any season of the year.

Due to the limited time that 2,4,5-T has been under test, definite recommendations cannot be made. However, extensive areas have been sprayed with a combination of equal parts of 2,4-D and 2,4,5-T. This combination appears more efficient than using 2,4-D alone. This does not imply that there is definite proof of synergism when these two herbicides are used in combination.

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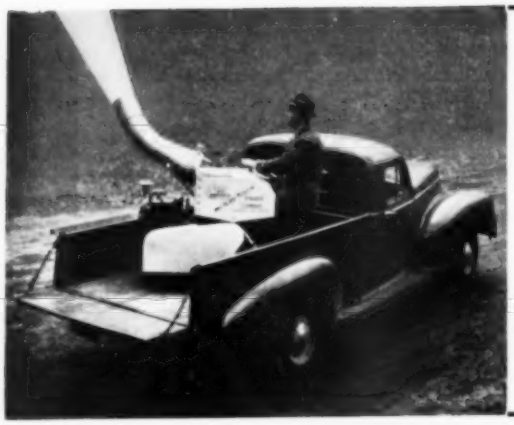

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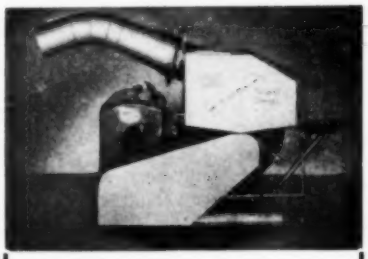

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- ★ NEW steel base reduces weight of sprayer 200 pounds.
- ★ NEW improved braking system.

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The dry salt of ammonium sulfamate applied to cut surfaces of stumps is recommended for preventing sprouting. Ammonium sulfamate as a foliage spray is recommended for control of woody plants that are not affected by 2,4-D or 2,4,5-T or when adjacent to sensitive crops.

New Herbicides

TCA is promising for the control of certain perennial grasses, such as quack, Bermuda, Kentucky blue, and Muhlenbergia species, when used at the rate of 80 to 100 pounds per acre. Johnson grass is more difficult to control. Best results are obtained when optimum moisture conditions for growth of the crop prevail. Inadequate or excessive moisture may affect results adversely. Grasses may be held in check without killing by the use of 10 to 15 pounds per acre. These dosages are based on TCA acid equivalent.

"TCA" is not selective at these rates and is destructive to valuable grasses, crops and woody plants. Residual toxicity persists for 30 days or more depending upon precipitation. Responses to the sodium and ammonium salts are similar. "TCA" is compatible with phenolic contact sprays and phenoxyacetic acid compounds. Prickly pear cactus has been effectively treated with "TCA" at one-half pound in one gallon of water applied to wet the plants.

IPC is promising at 3 to 5 pounds per acre for the control of certain annual grasses. The chemical should be present when the seed germinates. It is not recommended for control of perennial grasses and broad leaved weeds.

"PCP" formulations show much promise for preemergence treatments in large seeded and vegetatively propagated crops. Results with small seeded crops in general have been less favorable.

2,4,5-T is not a substitute for 2,4-D but is effective on certain woody species such as brambles, not easily controlled by 2,4-D. The best method of use is probably in combination with 2,4-D at concentrations of 1,000 to 1,500 p.p.m. of the ester of each as large volume, foliage wetting applications. Combinations are also recommended for stump treatments.

Hazards and Precautions

Spray drift of vapors of 2,4-D and 2,4,5-T may injure or kill susceptible plants in the neighborhood of the application.

Esters are more volatile than the salts and may under certain conditions cause serious injury to susceptible plants at a distance from the point of application.

Coarse sprays are much less likely to drift than fine sprays and equipment and methods should be developed that will favor safe use of 2,4-D herbicides.

MINOR ELEMENTS

(Continued from page 27)

ment may vary considerably even within a species. Dr. Roy A. Blair, of the Florida Everglades Experiment Station, (1) states, "According to some of our preliminary work, various strains of Bermuda grass show great differences in their requirements for copper. These differences show up, too, with respect to manganese. The competition of various strains of Bermuda, planted side by side, can be controlled. One strain can be made to dominate the other and run it out, simply by withholding copper or putting copper into any fertilizer in soil where there is not sufficient copper, or where the copper is not available". He says further, "With some of these grasses like Bermuda, you can purify them vegetatively. You can select a grass for its requirements for copper or any of the other of the minor elements, or for its tolerance to the lack of that minor element, and control competition".

Bair also found that by using a mixture of copper, manganese, zinc, and boron, it was possible to grow, in southern Florida, 65 out of 107 strains of bent grass and 75 strains of blue grass, species that are not supposed to live in Florida at all. He states, "We also have a good supply of other grasses that are not supposed to be adapted and the only answer can be that the minor elements, particularly copper, have made the difference. They are adapted if there is copper; they are not adapted if there is no copper".

In some soils, an extremely high organic content may tie up certain trace elements present and make such soils physiologically deficient. Such is the case in the saw-grass region of Florida, where it is necessary to add large amounts of copper before a satisfactory vegetable crop may be grown. Deficiences of this element in organic soils have also been reported from Michigan, Indiana, New York, North Carolina, and other states. Undoubtedly, there are many locations where a similar condition is marginal and passes without notice.

Beeson's maps of mineral nutritional diseases of plants and animals in the United States (3), which have frequently been reproduced and brought up to date, are often used to locate centers of mineral deficiencies. These locations indicate deficiencies so marked that the animals or plants present are severely affected. Hundreds of areas occur where the deficiences are moderate or so slight that the animals or plants do not show severe symptoms and may pass as normal. In addition, there are probably even more cases where trace element amendments would be of sufficient benefit to warrant their use. Such cases can be demonstrated only by field tests.

Examples of such tests are not common. Some of the most recent have been conducted by the Battelle Memorial Institute of Columbus, Ohio, on the effects of copper on the growth and quality of tobacco and other crops (4). This work, which was started in 1943, is still in progress, and is being sponsored by

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the Kennecott, Phelps-Dodge, and Anaconda Copper Corporations. Tests were conducted not only in areas where copper deficiency had been demonstrated, but also in locations where no such a deficiency had ever been shown.

In this work, approximately eighty per cent of the tests showed a response to the copper treatment, either through an increase in weight of the crop, quality, or both. The response could not be entirely correlated with the copper content of the soils except at the extreme ranges.

If we are to bring agricultural production to its maximum efficiency, additional work of this sort needs to be done, not only with copper, but with the other trace elements as well, and preferably in combination.

A few such tests are being carried out and undoubtedly, when their results become better known, the use of trace elements will become more common in areas where their value has been demonstrated.

Long Wait Looms

WARNINGS have been issued to farmers not to tamper with trace element amendments unless recommendations for their use have been made by authoritative sources. The fact is, however, that so little work is being done in connection with trace elements that the average farmer will wait for many years before such authoritative advice is forthcoming. The overworked county agricultural agents can be of little help in this matter, since they have, at present, no quick and accurate method of determining for their constituents, whether or not a particular farm would respond to the addition of one or more trace elements. Even their state experiment station is not usually equipped to give this advice. An arrangement by which some central laboratory, with modern equipment, could be employed for the purpose of carrying on soil tests on a considerable scale and at a reasonable cost, would be of inestimable benefit to research workers and farmers throughout the country.

A few years ago, a booklet was issued on the use of trace elements in the midwestern states. The conclusions drawn in this booklet, which received a rather wide circulation were, that except in a few unusual instances, trace element amendments were not advisable and that ordinary fertilizer contained a sufficient amount as impurities. If it were true that all fertilizers contained the percentages of these micronutrients shown in the booklet, and a sufficient amount of the fertilizer were used, trace element deficiencies would undoubtedly be at a miniumum where such fertilizer was applied. Unfortunately, one cannot depend

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on a sufficient quantity being present in the amounts of fertilizer used to satisfy the macronutrient requirements, while the fact remains that increasingly greater numbers of cases of trace element deficiency are being found.

The booklet contended, in referring to conditions in one state, that the boron content of seven typical crop-producing soils was far in excess of the minimum below which deficiency symptoms were likely to appear, and that the copper and zinc content of these soils was far above the average. In spite of this, boron deficiency has been observed at several scattered localities in that state. Copper analyses have been made on soils from three locations in the southern part of the state, and the results—2.82 p.p.m., 3.70 p.p.m., and 3.57 p.p.m.—were considerably below the average for seven other states in which experiments were made. It is of interest to note that the tobacco on the three locations mentioned above responded to a copper treatment and gave respective increases in leaf weight of 80, 24, and 240 lbs. per acre. It would seem, therefore, that generalizations concerning the value of trace elements in an area as large as a state will tend to be inaccurate.

Expanding interest in the value of trace elements has, in the past several years, increased the brands of fertilizer fortified with these plant nutrients. A reasonable increase in cost because of the added expense in mixing, and the slightly greater cost of the trace element ingredients, would not appear out of place. However, some complaints have come to light in which the dealer could not or would not supply needed amounts of regular fertilizer, but offered unlimited amounts of fortified fertilizer at sharply increased prices. Probably such cases are rare.

At present, with the possible

exception of boron in some states, it is not compulsory that the per cent of each trace element be included in the analysis of a fortified fertilizer. This omission needs to be corrected to protect the purchaser of such fertilizer and insure that his land is receiving adequate, but not excessive, amounts of the needed trace elements.

The increasing use of trace elements has attracted some persons into business who exaggerate in their advertising and tend to mislead the buyer. Various types of claims are made by such individuals. One will offer to sell at a high price, a universal soil amendment stating that it contains "dozens" of essential minerals necessary to health. Application of a little of this to the garden is claimed to assure that more delicious vegetables will be raised. No analysis accompanies this so-called fertilizer, of course.

Another group may furnish an analysis, and endeavor by a sheer weight of names to impress the buyer. Such analyses frequently indicate that the product contains elements like barium, vanadium, and titanium, known to be nonessential to plants and animals. One advertiser appeared to be proud of even the aluminum content of his amendment!

Some companies offer to test soil for a price, and seldom report an adequate supply for any trace element in the soil. The writer has taken soil samples in two states, from fields where analyses by one company showed no copper, zinc, nor manganese. A careful analysis in the Battelle laboratories indicated the presence of 4.95 p.p.m. of available copper from a field on one of these farms. On the second, in a different state, 2.5, 2.6, 2.9, and 3.6 p.p.m., were found in four fields. The subsoil on this second farm contained 9.6 p.p.m. of copper. These amounts of copper, except for that of the subsoil, are not high, but are measurable by suitably refined methods.

Of less importance is the flood of bottled liquid fertilizer which has come on the market in recent years. The chief objections are the usual inflated prices and the unfounded claims of the value. The fertilizing value of one such liquid, according to the label, would be greater than if the product were an impossible 100% N, P, and K.

It is difficult to draw a sharp line between such parasites and legitimate companies. There appear to be all intermediate grades. The only objection to some is the slightly exaggerated optimism concerning their product or service, which is scarcely a reason for protest in these days of high-pressure advertising. Still others—especially the well-established companies with adequate research programs and scientific control—are careful to offer their services and products without exaggerated or premature claims. These are the companies that may be expected to lead in the sound application of micronutrients.

There are many who think of the terms mineralization, fortified food, trace element sufficiency, and the like, as something mysterious and beyond the understanding of the layman. There is nothing mysterious about them. Human beings, animals, and plants, need certain elements in balanced or nearly balanced proportions for optimum growth and well being. When the balance is upset in too great a degree, the organism suffers.

Trace element deficiencies occur in animals and human beings because of unbalanced diets, and in plants because certain of the elements are not present in the soil, or are present in such disparate quantities as to be unavailable. With animals, deficiencies occur because the animals are not given access to a minerally adequate diet. It has been demonstrated that, given free choice, animals show a sense of discrimination concerning the nutritive value of their food, far greater than human beings.

A person's diet may be unbalanced by necessity, by choice or habit, or unconsciously as with a mineral deficient, but otherwise sufficient, food supply.

Our knowledge is increasing, but the subject is as old as civilization. Studies by the medical profession indicate that rickets, goiter, and probably other deficiency diseases occurred in certain parts of the world thousands of years ago. However, the recent findings that eastern and southern grown vegetables are not so nutritious as those grown farther West to Colorado, and the fact that much of our newly developed hybrid corn and strains of wheat contain proportionately less protein than the older varieties give us much to think about. A fertilizer program designed to increase the quality as well as the quantity of our food would do much toward raising the general health of our population.

References

[1] Bair, R. A., 1948, "Minor Elements in Production," The Greenkeepers' Reporter, March-April, pp. 28-31.

[2] Bear, F. E., Toth, S. J., and Prince, A. L., 1948, "Regional Variations in the Mineral Composition of Vegetables." (Read before the Soil Science Society of America, at Colorado Springs, August 25. To be published in the 1948 proceedings.)

[3] Beeson, K. C., 1945, "The Occurrence of Mineral Nutritional Diseases of Plants and Animals in the United States," Soil Science, **60**, pp. 9-13.

[4] Gilbert, F. A., 1948, "Copper as a Fertilizer Amendment for Tobacco and Other Crops," Better Crops with Plant Food, **32**, Feb. pp. 8-11, 44-46.

●

Freeport Elects Wingfield

E. D. Wingfield has been elected a vice-president of Freeport Sulphur Co., New York, the company has announced. Mr. Wingfield, who has been general manager of the company, will now be in charge of the firm's southern operations with offices in New Orleans, headquarters for the company's sulphur mines in Louisiana and Texas.

N. E. WEED CONFERENCE

(Continued from page 32)

pound per gallon of ATA and STA. Both materials were found to be temporary soil sterilants inhibiting germination and growth of broad-leaved annuals and perennials as well as grasses for a period of from several weeks to several months, Mr. Hodgon reported. STA appears to have a more potent residual effect than does ATA, and also seems to control quackgrass better at medium and low concentrations.

President Ahlgren was chairman of the final session of the meeting, on Friday afternoon. Frank L. Stark, American Cyanamid Co., New York, presented a paper on Cyanamid and its derivatives for weed control. He pointed out that although calcium cyanamid has been produced principally as a source of nitrogen for crop fertilization, the material is also suitable as a contact and selective herbicide, defoliant and as a soil treating compound for the killing of weed seeds.

The final paper of the meeting was presented by Keith C. Barrons, Dow Chemical Co., Midland, Michigan. He spoke on the phenolic herbicides as selective weed-killers, as general contact herbicides, as contact preemergence and pre-planting treatments, and as residual preemergence treatments. Still further uses for phenolic herbicides have been suggested, he stated. When applied to short weeds at the base of tall growing crops, the stems of the latter will not be injured. This technique has been used extensively on sugar cane and has possibilities with corn, Mr. Barrons pointed out. Residual pre-emergence chemicals have also been used as ground sprays in growing crops to prevent late emergence of weed seedlings, he said. Notable success has been obtained also with this method in pineapple and sugar cane, it was reported.

The program committee responsible for the details of the meeting was headed by Dr. Benjamin Wolf, Seabrook Farms, Bridgeton, N.J. Others on the committee included Dr. A. E. Prince, Maine Agricultural Experiment Station,Orono, Me.; and T. R. Cox, American Cynamid Co., New York. Committee advisors included Louis S. Evans, U.S.D.A., Beltsville, Md.; Dale E. Wolf, Rutgers University, New Brunswick, N.J. and R. H. Beatty, American Chemical Paint Co., Ambler, Pa.

•

Two Bozeman Meetings

Partial programs for the fourth annual meeting of the Western Seed Officials Association and the eleventh annual meeting of the Western Weed Control Conference were announced early in the year by officers of the two groups. The

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Seed Association meeting was scheduled to be held February 1, and the Weed Control Conference on February 3 and 4. Both meetings were to be at Bozeman, Montana.

The advance program stated that Walter S. Ball, Sacramento, Calif., president of the seed group, would open the meeting Tuesday morning. Reports of projects undertaken under the Research and Marketing Act will be given, and V. C. Hubbard, North Montana Branch Station will discuss "The Effect of Spraying of 2,4-D on the Germination of Cereal Grains." Other problems of law enforcement were to be discussed, and a session under W. D. Hay of the U.S. Dept. of Agriculture was to present changes in the Rules and Regulations under the Federal Seed Act as suggested by the Western States.

Although the entire program for the Western Weed Control Conference has not been announced as this issue went to press, a considerable portion of the schedule had taken shape. A number of research papers were to be presented at a session with L. W. Rasmussen as chairman; an Education-Extension section under the chairmanship of W. W. Robbins, and a number of committee reports were slated for the first day of the meeting.

The second day was to be opened with a call to order by B. J. Thornton, president of the Western Conference. R. R. Renne, president of Montana State College was to address the group, followed by a talk by L. W. Kephart, U.S.D.A., Beltsville, Md. The annual banquet was to be held on Thursday night.

Friday's activities were to include a discussion of new developments in herbicides, a report of the North Central Weed Control Conference, and a talk on airplane application of herbicides. The meeting was to adjourn following the reports of nine committees.

Two New Dow Products

Dow Chemical Co., Midland, Mich., has placed on the market two new products, according to Wm. W. Allen, manager of the company's Agricultural Chemical Division. The new products are "Ferradow" and "Dow Parathion-25%-Wettable".

The former is a fungicide for control of cherry leaf spot, apple scab, sooty blotch on pears, tobacco blue mold, apple rust and other fungus diseases. The latter, an insecticide, is to be used as a dust concentrate for control of wooly aphids, mealy bugs, mites and other fruit pests as well as insects infesting nursery stock and truck and field crops.

•

New Hercules Office

Hercules Powder Company, Wilmington, Del., has announced the opening of a new sales and technical service office in Dallas, Texas. The office is in charge of P. J. Reno, who for the past several years has been working with various state and federal agricultural agencies, cotton growers and insecticide manufacturers on the application of toxaphene.

The company has also announced the selection of William H. Burnside, as technical service representative who will operate from Hercules' offices in Los Angeles and San Francisco. He is to work in the states of California, N. Mexico, Nevada, Washington and Oregon.

PARATHION

(*Continued from page* 35)

duced somewhat where one and two grams of parathion were used. Retardation of growth of the seedlings was evident in all cases, and was very pronounced where two grams of the toxicant were used in each pot of soil.

Tests on Bean Beetle

IN preliminary tests individual bean leaves were plucked from bean plants grown in soil mixed with parathion and placed in covered petri dishes with bean beetle larvae. Under these conditions the kill of the larvae was quite high, and it varied with the amount of feeding. It was very high where newly hatched larvae were placed on bean leaves taken from plants grown in soil that contained only .25 grams of parathion to each 500 grams of soil. These tests pointed to a kill by the toxicant as an intestinal poison.

In the subsequent tests reported below, the seedlings grown in the pots were removed from the soil, placed in individual vials of water and removed to a constant temperature room after the larvae were placed on them.

No kill of bean beetle larvae was procured where the lowest concentration of parathion was used. The other three concentrations used showed 30 to 100 percent kill, the peak of mortality of which was three weeks after planting of the seed. The kills declined rapidly to zero from the third to the sixth weeks.

Tests on 2-Spotted Mite

BEAN plants two weeks old grown in soil treated with the four strengths of parathion were placed among other plants which had a very heavy infestation of the two-spotted mite. Five, seven, and twenty one days later all plants showed mite infestations. During this time bean beetle larvae were unable to survive on similarly treated bean plants. It is possible that some kill of some stages of the mites took place, but this was not determined definitely in the limited tests conducted.

Tests With Potatoes

IN the tests with potatoes, some plants were grown from tubers, each tuber being cut into five seed pieces and planted in as many pots, while in other cases they were grown from whole small size tubers. During the period of eleven weeks of growth

when some degree of potato aphid kills were procured, the plants grew to twenty inches in height. These tests included therefore, a determination of aphid kills on the growing terminals where the potato aphid commonly develops, as well as upon compound leaves taken from various parts of the plants; the object being to ascertain if all parts of the plants gave a similar degree of kill of the aphids.

The figures in Table 3 (p. 83) show that where the three lowest concentrations of parathion were used there was practically no reduction in height when compared with the check plants from the second to the eleventh weeks. Where the strongest dosage of two grams of the 15 percent wettable powder was used, the plants were smaller than the check plants by about 25 percent at the end of the first two weeks. However by the end of the eleventh week they were only ten percent under normal size.

In addition to showing some dwarfing, the plants grown in the two gram treated soil showed a rosette-like condition of the new growth, and the margins of the older leaves were somewhat curled.

Tests on Potato Aphid

IN some tests terminal growths were pinched from potato plants at weekly intervals. They were infested with grown aphids and placed in vials of water in the temperature controlled room. Kills were procured only on terminals taken from plants grown in soil containmg two grams of parathion. The kill was limited to only ten percent at 3, 4, 6 and 10 weeks after planting. Nearly 48 hours contact with or feeding upon the terminals were necessary for any mortality. Colonies were readily maintained through reproduction.

When compound leaves taken from the lower third of the plant were used, the aphid mortality was found to be as shown in graph number 3.

The highest concentration of two grams per pot gave 100 percent mortality over a five week period and dropped to zero during the eighth to eleventh weeks after planting. The three highest concentrations gave 100 percent kills only at the end of the sixth week. The maximum kill produced by the lowest concentration was 20 percent. This kill was also recorded at the end of the sixth week after planting.

Other tests indicated strongly that at a given concentration of the toxicant, the older the leaves, the higher the degree of aphid kill over a longer period of time.

Growth retardation of the squash plants is indicated in the above figures where the parathion was incorporated in the soil. Where the lowest concentration was used, the plants were about equal in size to the check plants at the sixth week after planting. Where the highest concentration of the chemical was

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used, the plants were 50, 25 and 19 percent less in height than the check plants at the end of the second, sixth, and ninth weeks respectively. Also the check plants maintained a general healthier appearance.

Tests on the Melon Aphid

IN these tests the adult aphids were placed upon leaves plucked from the various plants, and the leaves were in turn transferred to vials of water to be kept at constant room temperature until the aphid mortality was ascertained.

Graph no. 4 shows that a 100 percent kill of the melon aphid was obtained only where the maximum concentration was used, and only at eight weeks after planting. The maximum kill with one gram per pot was never higher than 70 percent. No kill was evident at any time up to ten weeks where only .25 grams of the toxicant was used per pot.

The degree of kill of the melon aphid on squash plants was much lower than that of other kinds of aphids on other plants, the of aphids on other plants, tests of which are described above.

Parathion Placed in Soil

IN these tests it was desired to ascertain if the parathion in 15 percent wettable powder form might change in any way when mixed in the soil 3, 7, and 10 days before the seeds were planted. It was thought that the insect kills might be increased and that there might be more or less growth retardation.

Accordingly three grams were mixed in each pot of 500 grams of soil There were four replicates of each and four checks. Fifteen nasturtium seeds were planted in each pot. The tests were limited to nasturtium plants and the black bean aphid

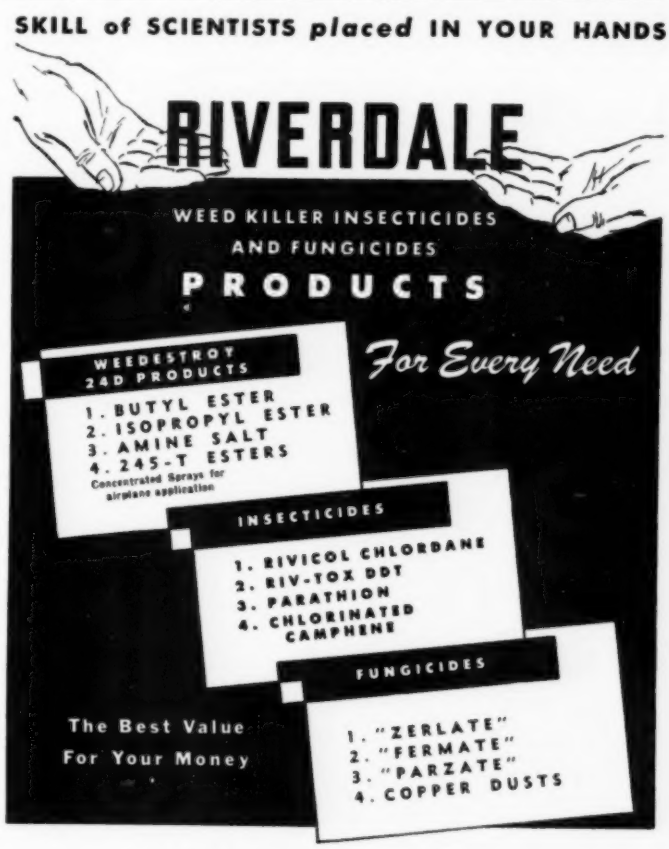
The germination was about ten percent less than where two grams per pot had been used, which might be expected in the increased dosage. There was no decrease in germination ev dent because the parathion had been placed in the pots some days before planting.

Reduction in size of the plants was evident. At the end of eight weeks the plants grown in soil in which the parathion had been mixed, 3, 7, and 10 days prior to planting were 19, 14, and 17 percent shorter in size respectively than their check plants. It can be concluded tentatively that the lessened plant growth is due to the use of three grams of the toxicant in all cases, rather than to the introduction of the parathion into the soil some days before planting.

Tests on Black Bean Aphid

THE procedure for the tests was identical to that used in the previously tests except that a single dosage of three grams was used throughout, and it was mixed in the soil 3, 7, and 10 days before the seed was planted. The results are shown in Table no. 5.

The results indicate that the



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peak of the aphid kill was obtained in all cases about the fifth and sixth weeks after the seed was planted. In these limited tests the aphid mortality did not extend over quite as long a period of time as where only two grams were used and introduced into the soil at the time of planting. Also the degree of kill was not quite as high. The limited data available point to a possible deterioriation of the toxicant when it is introduced into the soil some days prior to planting. Time did not permit an extension of these tests.

Summary

ON the basis of the greenhouse tests described above, parathion in a 15 percent wettable powder form is translocated to nasturtium, bean, and squash plants grown from seed, and to potato plants grown from tubers, when it is introduced into the soil before or at the time the seed are planted. The translocation is sufficient to cause a mortality of some insects placed on the growing plants.

Two grams of the powder mixed in 500 grams of soil gave 100 percent mortality of the black bean aphid on nasturtium seedlings for a period of seven weeks. Lesser amounts produced lower kills. A similar dosage killed 100 percent of third instar bean beetle larvae from the second to the third weeks after planting of the bean seed, but it did not appear to be effective against the two-spotted mite on the bean plants.

When two grams of the powder were mixed in 500 grams of soil and potato tubers planted in it, 100 percent kills of the potato aphid were procured from the third to the eighth weeks on the lower and older compound leaves. The mortality was nearly as high where one gram per 500 grams of soil was used. On the new growth terminals of the same plants the maximum kill was ten percent or less and it extended over a period of about seven weeks.

Used in the soil growing squash plants, two grams to 500 grams of soil produced 100 percent mortality of the melon aphid only at eight weeks after planting the seed. The kill was relatively low as compared with other plants and other insects and was entirely negative when 0.25 grams were used per pot of soil.

Parathion in the 15 percent wettable powder form used at the rate of three grams per 500 grams of soil at 3, 7, and 10 day periods prior to planting bean seeds in it, apparently lost little if any of its toxicity. It gave very high kills of the black bean aphid placed on the foliage.

Retardation of early growth of plants was evident in nearly all cases, but at the end of eight to eleven weeks the insecticide material was no longer effective. The plants grown in treated soil almost equaled in size the control plants.

Table 1
Tests With Nasturtium Plants
Height and Germination

Grams parathion per pot	Percent germination*	Average Height in Inches of Four Replicates Weeks after Planting 2	3	4	5	6	7	9	10	11
.25	90	4.31	6.31	7.00	8.68	9.68	10.43	12.31	13.62	14.68
.50	72	4.50	6.56	7.12	8.87	9.75	10.87	12.81	13.81	14.93
1.00	87	4.31	6.62	7.31	8.62	9.62	10.68	12.75	13.75	14.75
2.00	70	4.12	6.25	7.00	8.50	9.56	10.75	12.62	13.68	14.62
Check	68	4.81	6.56	7.06	8.56	9.87	10.87	12.87	13.81	14.81

*15 seeds per pot

Table 2
Tests With Bean Plants
Height and Germination

Grams parathion per pot	Percent germination*	Average Height in Inches of Four Replicates Weeks after Planting 2	3	4	5
.25	57	5.56	11.06	13.50	14.68
.50	67	5.50	11.75	13.87	14.87
1.00	52	4.18	10.31	13.25	14.18
2.00	43	2.56	5.93	5.93	5.93
Check	53	5.68	11.12	13.62	14.93

*15 seeds per pot

Table 3
Tests with Potatoes
Height and Germination

Grams parathion per pot	No. of tubers germinated	Average Height in Inches of Four Replicates Weeks after Planting 2	3	4	5	6	8	9	10	11
.25	4	7.87	11.31	12.75	13.87	14.81	16.18	17.18	18.62	19.81
.50	4	7.56	11.12	12.56	13.81	14.87	16.12	17.25	18.18	19.37
1.00	4	7.81	11.00	12.68	13.75	14.75	16.00	17.12	18.56	19.50
2.00	4	5.93	9.06	10.75	11.87	12.93	14.93	16.00	16.93	18.00
Check	4	7.81	11.12	12.56	13.93	15.00	16.12	17.43	18.68	20.06

Table 4
Tests on Squash Plants
Height and Germination

Grams parathion per pot	Per Cent germination	Average Height in Inches of Four Replicates Weeks after Planting 2	3	4	6	7	8	9
.25	90	4.18	5.12	6.37	8.75	9.93	10.87	11.81
.50	90	3.31	5.00	6.06	8.56	9.87	10.93	11.93
1.00	90	2.62	4.87	5.93	7.43	8.68	9.87	10.81
2.00	100	2.12	3.87	4.87	6.50	7.62	8.68	9.75
Check	90	4.25	5.18	6.43	8.68	9.93	10.93	12.00

Table 5

No. of days in soil before planting seed	Percentage of Aphids Killed after Forty-eight Hours Number of Weeks after Planting 3 weeks	4 weeks	5 weeks	6 weeks	8 weeks	9 weeks	10 weeks	11 weeks
3	75	85	100	95	65	35	15	0
Check	0	0	0	0	0	0	0	0
7	85	90	100	60	35	15	0	0
Check	0	0	0	0	0	0	0	0
10	80	95	—	100	25	0	—	—
Check	0	0	—	0	0	0	—	—

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Approximately 200 pounds of technical parathion would need to be incorporated on a surface of soil to procure insect kills equivalent to those shown in the greenhouse tests, in which one gram of parathion, in a 15 percent wettable powder form was used to 500 grams of air dried soil.

Reference

Questrel, D. D. and Connin, R. V. 1947. A chemical treatment of soil which produces plant tissues lethal to European corn borer. Journ. Ec. Ent. Vol. 40, No. 6, p. 914.

COMMENTS

(Continued from page 49)

pesticides far outweigh their possible hazards. They can be used with safety when sensible precautions are heeded . . . but it should be emphasized that every economic poison should be handled with care.

Fanatics argued years ago that spraying of apple trees should be abandoned and the public should be allowed to eat the wormy fruit since well-cooked insects were harmless. Unfortunately, if insects were uncontrolled, fruit and produce would be too perishable to be marketed, and the trees themselves could not continue to produce adequately. The puny results of such treatment are to be seen in the Philippine Islands and in many backyards in the U.S.

More is to be accomplished by education and cooperation than by dogmatism or a display of might. Care should be taken not to alarm the public unnecessarily, for without some background of the facts many persons become unduly alarmed. One recalls the occasion some years ago when about twenty persons at a country club were poisoned. The cause was attributed to arsenical residue on broccoli, and sensational stories were carried by many newspapers. The way this reacted on the public is seen by the fact that the day before this event, there were seven carloads of broccoli sold in that city and the next day, only six crates. It so happened that the State Bureau of Chemistry had analyzed that very broccoli, and its arsenical content was found to be only one-fifth of what the law allows! Three weeks later, lost in the back pages of a newspaper was an inconspicuous item which stated that the illnesses were due to ptomaine poisoning. That first ill-advised report cost the farmers of California over a half-million dollars in reduced sales.

The whole problem of agricultural spray and dust residues should be in the hands of broad-minded, experienced, independent and very well-informed scientific and technical persons in whom all can have confidence. It seems desirable for a recognized liaison committee of scientific and technical men to accumulate all available data with regard to pesticide residues in order to establish a sound basis on which government agencies should act.**

LISTENING POST

(Continued from page 45)

infected fruits from plots sprayed with benzene hexachloride, chlordane, toxaphene, and Parathion.

In the toxaphene plots more than half of the foliage and all of the fruit dropped within 10 days after the third application. This treatment was discontinued at that time and the trees made rapid recovery. No other material caused noticeable injury.

These data show that the acid lead arsenate/zinc sulfate/hydrated lime mixture commonly used on peaches gave a considerable degree of protection against peach scab. On the other hand, the organic insecticides used gave little if any protection. Where such materials are used, close attention should be given to the correct timing of sulfur applications for the control of scab.**

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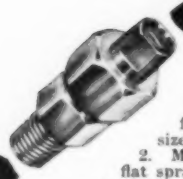

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Industry Patents

2,454,409. Manufacture of Sulfur Compounds. Patent issued November 23, to Walter A. Schulze and Willie W. Crouch, Bartlesville, Okla., assignors to Phillips Petroleum Co. A process for synthesizing mercaptans which comprises contacting a reaction feed, whose sole reactive components consist of hydrogen sulfide and at least one olefinic hydrocarbon, with a liquid catalyst comprising concentrated hydrofluoric acid containing at least 50 weight per cent hydrogen fluoride, at a temperature within the range of 32 to 100° F. and for a contact time not exceeding about 25 minutes, and maintaining in the reaction zone at all times a molal excess of hydrogen sulfide over the olefin with an H_2S : olefin mol ratio between about 1 and about 5 suppressing secondary reactions, thereby producing a resultant reaction mixture containing the mercaptan product resulting from addition of hydrogen sulfide to said olefinic hydrocarbon in quantities in substantial excess of the quantity of any unreacted olefin plus any secondary products.

2,454,594. Method and Apparatus for Spraying. Patent issued November 23, to N. C. Christensen, Salt Lake City, Utah. In an apparatus for spraying liquids, the combination of a cylinder mounted to rotate about its axis, said axis being substantially horizontal, a support having a surface approximately coextensive with the length of the cylinder opposed to the cylinder at the bottom thereof, said surface being parallel with the cylinder, and spaced a short distance therefrom to form throughout substantially the entire length of the cylinder a slender throat, said surface having a supply area in front of the throat arranged to guide liquid sustained thereby to the throat, and having, behind the throat, a discharge area so formed that liquid tends to flow over it by gravity out of and away from the throat; means for forming on said supply area a layer of liquid moving towards said throat and of a depth not less than, and not materially more than, the height of the throat, and means for varying the thickness of said layer within said limits.

2,457,674. Fungicidal Compositions. Patent issued December 28, 1948 to J. W. Heuberger, Newark, Del., assignor to Rohm & Haas Co., Philadelphia. A fungicidal composition adapted for agricultural use comprising a water-soluble salt of an alkylene bisdithiocarbamic acid, a water-soluble salt of zinc, and lime.

Trade Mark Applications

Pennsalt Arresto-Moth, in small capital letters for insecticides. Filed Apr. 26, 1947 by Pennsylvania Salt Mfg. Co., Philadelphia. Claims use since Apr. 7, 1947.

Rivicol, in sans serif capital letters, for insecticides. Filed Feb. 10, 1948, by Riverdale Chemical Co., Harvey, Ill. Claims use since June 1, 1945.

Gold Bond, in heavy capital letters, for fertilizers. Filed July 12, 1947, by Armour & Co., Chicago, Ill. Claims use since 1912.

Vitagreen, in script letters, for fertilizer and plant food. Filed Mar. 15, 1948, by Raw River Valley Fertilizer Co., Lawrence, Kansas.

DB-50, in heavy capital letters, for insecticides. Filed Dec. 1, 1945, by Pennsylvania Salt Mfg. Co., Philadelphia. Claims use since May 17, 1945.

Azofume-70, in small capital letters, for fumigant used for control of red spider. Filed Mar. 1, 1946, by Plant Products Corp., Blue Pt., N.Y. Claims use since Nov. 9, 1945.

Tat Formula '83'. The word "tat" in open capital letters and remainder of name in capital letters, for poisons for rodents, insects and other pests. Filed Jan. 18, 1947, by O. E. Linck Co., Inc., Clifton, N.J.

Glid-N, in oval box, white letters on black background, for herbicides, and insecticides. Filed Dec. 24, 1947, by the Glidden Co., Cleveland, Ohio. Claims use since Feb. 6, 1947.

Triangle, with point at top, for fertilizers. Filed July 14, 1947, by Darling & Co., Chicago. Claims use since 1913.

Trace L, in hand lettered outline-type script, for mineral fertilizer. Filed June 9, 1948, by Saratoga Laboratories, Inc., New York. Claims use since June 2, 1948.

Victawet, in stencil capital letters, for wetting agents. Filed July 12, 1947, by Victor Chemical Works, Chicago. Claims use since January, 1946.

Eastern States Cooperative, in horse-shaped arc, with black base, for fertilizers. Filed Mar. 5, 1948, by Eastern States Farmers' Exchange, West Springfield, Mass. Claims use since Jan. 2, 1934.

•

Somerville to Niagara

M. L. Somerville, formerly manager of production in the Bound Brook, N. J., agricultural chemicals division plant of Sherwin-Williams Co., has announced his recent resignation. He has since joined Niagara Sprayer Division of Food Machinery Corporation, and as of February 1, is in charge of the Niagara plant at Jacksonville, Florida.

Mr. Somerville, well known in the agricultural chemical field, had been with Sherwin-Williams Co. for 30 years. His career with S-W began in Chicago where he worked four years before being transferred to Bound Brook. Before his Sherwin-Williams connection, he had for a short time been employed by the V.S.D.A. in Washington, D. C.

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Salesman Wanted: A well established company requires the services of an experienced man to handle excellent line of agricultural insecticides and fungicides in New Jersey and Eastern Shore area. Prefer a man with some training in Entomology or Plant Pathology. Address Box 318 care of Agricultural Chemicals.

Entomologist Wanted: To head service department of large pest control firm with home office in Pittsburgh and branches in several cities. Candidate should have several years of field experience and preferably Ph.D. Duties would include handling sizable staff of service-men, training new men for pest control work, supervising insecticide formulations. This is a "big" job with unlimited possibilities. There is available a nice five-room, two-bedroom apartment at very reasonable rental. Submit complete data on training, experience, salary requirements and photo. Strictly confidential. Address: Mr. L. C. Crosby, President, Commonwealth Sanitation Co., 3507 Bigelow Blvd., Pittsburgh 13, Pa.

Salesmen: Long established manufacturer of insecticide raw materials requires several young men to operate from home territories in Southeast, Southwest, and West Coast as sales representatives. Must be conversant with and have experience selling to household and agricultural insecticide manufacturers, formulators, and mixers. Excellent opportunity for men with imagination and desire to secure a permanent position. Salary. All correspondence strictly confidential. Write Box 327, care of Agricultural Chemicals.

Agricultural Sales: Established chemical firm requires man for field sales and service work in fumigants and allied chemicals. Dealer and consumer trade, willing to travel. Background in Horticulture or related fields desirable. Headquarters in Philadelphia. State experience and salary desired. Address Box 326, care of Agricultural Chemicals.

ALVIN J. COX, Ph.D.
Chemical Engineer and Chemist
(Formerly Director of Science, Government of the Philippine Islands. Retired Chief, Bureau of Chemistry, State of California, Department of Agriculture.)
ADVISOR ON AGRICULTURAL CHEMICAL PROBLEMS AND INVESTIGATIONS
Consultant in reference to spray injury and damage, claims, including imports of fruits and nuts, formulas, labeling, advertising and compliance with law.
1118 Emerson Street
Palo Alto, California

positions wanted

Entomologist, Ph.D. Desires position in technical service with firm engaged in manufacturing or sale of agricultural chemicals. 12 years experience in fields of insecticides, fungicides, and herbicides with state and commercial agencies. Excellent references. Address Box 319 care of Agricultural Chemicals.

Entomologist: Desires position to assist in biological and chemical tests of insecticides. Able to do stenographic work. Address Box 320, care of Agricultural Chemicals.

Insecticides: Salesman with ten years experience with two nationally-known manufacturers of basic insecticide and allied materials desires sales position with manufacturer. Will travel anywhere. Will supply full information. Address Box 323, care of Agricultural Chemicals.

Chemical Sales Executive: 35, well known, completely grounded in agricultural and industrial markets (bulk and consumer package). Product development, field research and sales administration. Knowledge organic fungicides, herbicides, insecticides, detergents, antiseptics, germicides, textile finishes, resins, rubber compounds, emulsifiers, degreasers. Seeks responsible position with progressive manufacturer chemical or allied field. Locate New York or environs. Address Box 325, care of Agricultural Chemicals.

miscellaneous

Phosphates: Dealer and distributor desires to represent manufacturer of superphosphate and other phosphates in fertilizer and allied markets in Wyoming and adjacent states. For further details, communicate with Box 324 care of Agricultural Chemicals.

Pennsalt Bugs Mixed

Pennsylvania Salt Mfg. Co. is toying with the idea of changing its slant on advertising to include obvious errors, according to Jack Brunton, sales manager of the company's Agricultural Chemicals Division. The Pennsalt ad which appeared on page 2 of the January issue of Agricultural Chemicals carried a drawing which was supposed to represent a Mexican bean beetle, but which was actually a bean leaf beetle. The company's Philadelphia office has been beseiged since with scores of letters from horrified entomologists the country over, pointing out the error.

Mr. Brunton, in commenting on the situation, says that since an ad with an error causes such a furore in the trade, why not run wrong ads from here on, and keep things stirred up? It would serve to let the advertiser know that his sales talk is being read by more people than he thought!

Just how the bean leaf beetle happened to appear in the ad is a mystery to the Pennsalt people. Mr. Brunton says that the insect apparently underwent a strange metamorphosis, since it was a bean beetle when it left the Widener building offices of Pennsalt to go to the advertising agency. Perhaps the agency artist saw strange spots in front of his eyes and put them on the back of the beetle . . . maybe he thought the bean beetle would look more like a 1949 model with a new body design . . . or did he get his beetles mixed? Whatever the reason, the Pennsalt boys are getting a big kick out of the incident, although they still feel a bit apologetic toward the scores of entomologists around the country whose sense of scientific precision may have been offended.

And, as a note to others who noticed the wrong bug and have intended to write in about it . . . the Pennsalt boys are very much aware of the mistake.

Jap Fertilizer Starts

Rehabilitation of three Japanese fertilizer plants has been virtually completed, according to reports reaching the U. S. The restored factories are units of the Nittoh Chemical Industry Co. at Yokohama, Tokyo, and Hachinoe. They were severely damaged by bombs during the war.

Output of ammonium sulfate at the Hachinoe and Tokyo plants is some 50,000 tons annually. The Tokyo plant produces 90,000 tons of superphosphate of lime and the Yokohama plant 30,000 tons annually.

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Md. Fertilizer Conf.

The Maryland Fertilizer Conference, scheduled to be held January 28 for the first time at the University of Maryland since the war, was expected to attract more than 100 fertilizer salesmen, dealers and manufacturers. The announced purpose of the meeting was to talk over new developments in fertilizer research.

In addition to topics dealing with research, the discussion will include the effect of grassland agriculture on fertilizer use in Maryland, the fertilization of fruits and vegetables and a report of a four-year study on fertilizing for maximum corn yields. Dr. Albin Kuhn, head of the agronomy department at Maryland, was to be in charge of the meeting.

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Retires from USDA

Miss Mary G. Van Meter, for thirty-three years with the U. S. Department of Agriculture, retired recently. Miss Van Meter was the chief clerk of the Division of Mycology and Disease, a position she had held for many years. Some 150 of her friends in the Bureau at Beltsville, gathered for the farewell party and presented Miss Van Meter with a handbag and a gift travel order.

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(The Advertisers' Index has been carefully checked but no responsibility can be assumed for any omission.)

Tricky, but . . .

The old Hindu rope trick is amusing, attracts momentary attention,—but is quickly over and forgotten. Like tricky and spotty advertising! In your mind one minute and gone the next,—in sharp contrast to the proved value of steady regular advertising that bangs away month in and month out,—the proved cumulative value of continuity,—the proved value of keeping your firm and your products constantly before those to whom you sell.

And, if perchance, it happens to be the field of agricultural chemicals which you sell and want to continue to sell, we suggest consideration of regular advertising in

AGRICULTURAL CHEMICALS

254 West 31st Street New York 1, N. Y.

TALE ENDS

WEED control was "given the air" during the recent Northeastern Weed Control Conference in New York. Station WJZ invited L. W. Kephart, U.S.D.A. and Dale Wolf, Rutgers University, to appear on a televised program Thursday evening, January 6. The pair used the opportunity to help straighten out some of the confusion about 2,4-D and what it will not do as well as its effective properties on certain plants. Mr. Kephart stated afterwards that he had not seen a television program before, but enjoyed being on the air. Mr. Wolf said he was "nervous" during the telecast, but was happy to have had the privilege.

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One of the most talked-about events on the New York weed control conference program was a movie presented by Kaman Aircraft Corp., Windsor Locks, Conn., showing a performance by the company's helicopter said to be adaptable for spraying and dusting of various toxicants. The machine was pictured rising straight up in the air, flying backwards, "parking" on the roof of a small shed, and proceding slowly over crop areas in dusting activities.

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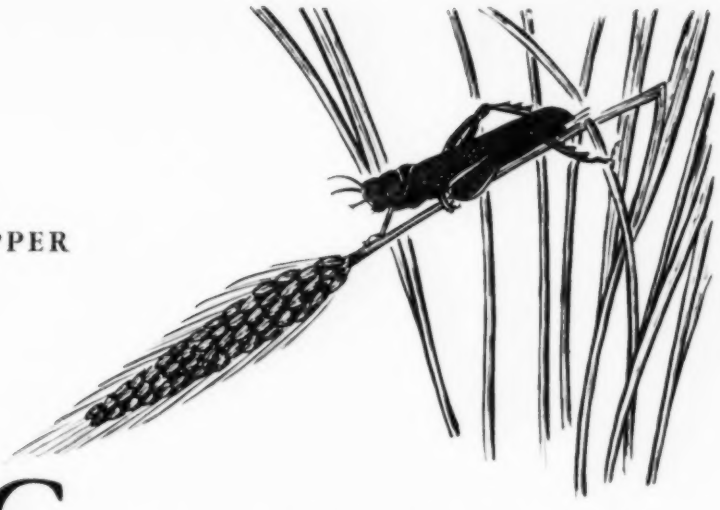
The *Farm Journal's* February issue carries an article by David G. Hall B.E.P.Q., U.S.D.A., warning that an unusual outbreak of grasshoppers may occur in 1949. The article recommends use of toxaphene and chlordane for control of the 'hoppers'. Featured with the article are three photos of grasshoppers one taken before contacting the insecticide, another 16 hours after, and the last one, 40 hours after. These pictures, taken by R. Vishniac, are graphically portrayed, showing the insect's action after being affected by the toxic material.

THE
GRASSHOPPER



BUG OF THE MONTH

... controlled with BHC, CHLORDANE, TOXAPHENE

GRASSHOPPERS in teeming swarms have chewed a path through all of recorded history. From the Biblical "plague of the locusts" to the world-wide infestations this year, they have brought famine and death to millions of human beings.

With the new chlorinated toxicants, however, remarkable control can be achieved, far beyond any earlier experience. These new-type poisons appear to be so remarkably effective because they are slowly volatile. They not only kill as the bait is eaten, but tend to deplete the hordes by contact and fumigant action in addition.

Toxicants of this type which have been successfully used are BHC, Chlordane, and Toxaphene. Prentiss offers concentrates based on all three, in the complete line of Prentox Pest-Tested Insecticide Concentrates.

We suggest that you investigate the potentials for grasshopper, locust and cricket control in your marketing area. Full information on the latest developments is available on request.

R. J. PRENTISS & CO., Inc.

110 WILLIAM STREET, NEW YORK 7, N. Y. 9 SO. CLINTON STREET, CHICAGO 6, ILL.

PRENTOX PEST-TESTED CONCENTRATES SOLD TO
INSECTICIDE MANUFACTURERS ONLY

DDT CONCENTRATES • SABADILLA DUST CONCENTRATE • PYRETHRUM PRODUCTS • CHLORDANE CONCENTRATES • CUBÉ POWDER

AN ANNOUNCEMENT

Concerning the Name

TOXAPHENE

In response to the need for a simple and generally acceptable name for the insecticidal chemical known as chlorinated camphene, Hercules Powder Company has relinquished the trade-mark name Toxaphene. The word toxaphene has now been accepted as a coined common name for chlorinated camphene having a chlorine content of 67%-69%.

Those participating in the acceptance of this common name and concurring in its suitability include: "Chemical Abstracts" of the American Chemical Society; Council on Pharmacy and Chemistry of the American Medical Association; Committee on Insecticide Terminology of the American Association of Economic Entomologists; the National Association of Economic Poisons Control Officials; representatives of the Insecticide Division of the Production and Marketing Administration; the Food and Drug Administration; the Public Health Service; and the Bureau of Entomology and Plant Quarantine.

HERCULES POWDER COMPANY

INCORPORATED

993 Market Street, Wilmington 99, Del.